IMPORTANT BIRD AND BIODIVERSITY AREAS IN INDIA

Priority sites for Conservation

Revised and updated 2nd Edition Vol. II

BirdLife INTERNATIONAL

BNHS India CONSERVING NATURE SINCE 1883

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Second Edition: Revised and Updated

Volume II

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MANIPUR

DHRITIMAN MUKHERJEE

Loktak Lake with its floating vegetation, locally called phumdies, is one of the most characteristic and wellknown features of the state

Manipur (23° 50'–25° 42' N and 92° 59'–94° 46' E) has an area of 2,232,700 ha which constitutes 0.7% of the country's geographical area. Manipur is bounded by Nagaland in the north, Mizoram in the southwest, Myanmar in the east and south, and the Cachar district of Assam in the west. The total number of districts in the State is nine. The terrain in the State is predominantly hilly, except a broad central oval-shaped valley extending over about 1,800 sq. km. The capital city of Imphal is located in this valley.

The average altitude of the valley is 850 m while the maximum altitude of the hilly region is almost 3,000 m. There are four major rivers and river basins in Manipur, namely, the Barak River Basin (Barak Valley) to the west, the Manipur River Basin in central Manipur, the Yu River Basin in the east, and a portion of the Lanye River Basin in the north. Loktak, a large freshwater lake, lies to the south of the valley. Almost all rivers of the valley deposit their water and sediment load in the Loktak Lake. There is hardly any forest left in the valley; the fertile alluvial plain was cleared for cultivation long ago. The natural forest is mainly found in patches in the hills. Towards the east and the southeast, three lakes, Ikop Pat, Kharung Pat and Pumlen Pat, complete the wetland ecosystem of the Manipur Valley.

History tells us that Manipur came under the British rule as a princely state in 1891. In 1947, a democratic form of government was established with the Maharaja as the Executive Head, and a legislature was instituted, only to be dissolved in 1949. In 1963, the legislative assembly was established, and on January 21, 1972, Manipur achieved full statehood.

The State has witnessed bitter ethnic conflict in recent times. The ethnic hostility between the Kukis and the Nagas has a deep-rooted historical background. As per the 2001 census, the population of the Kukis is 0.25 million and the Nagas 0.4 million.

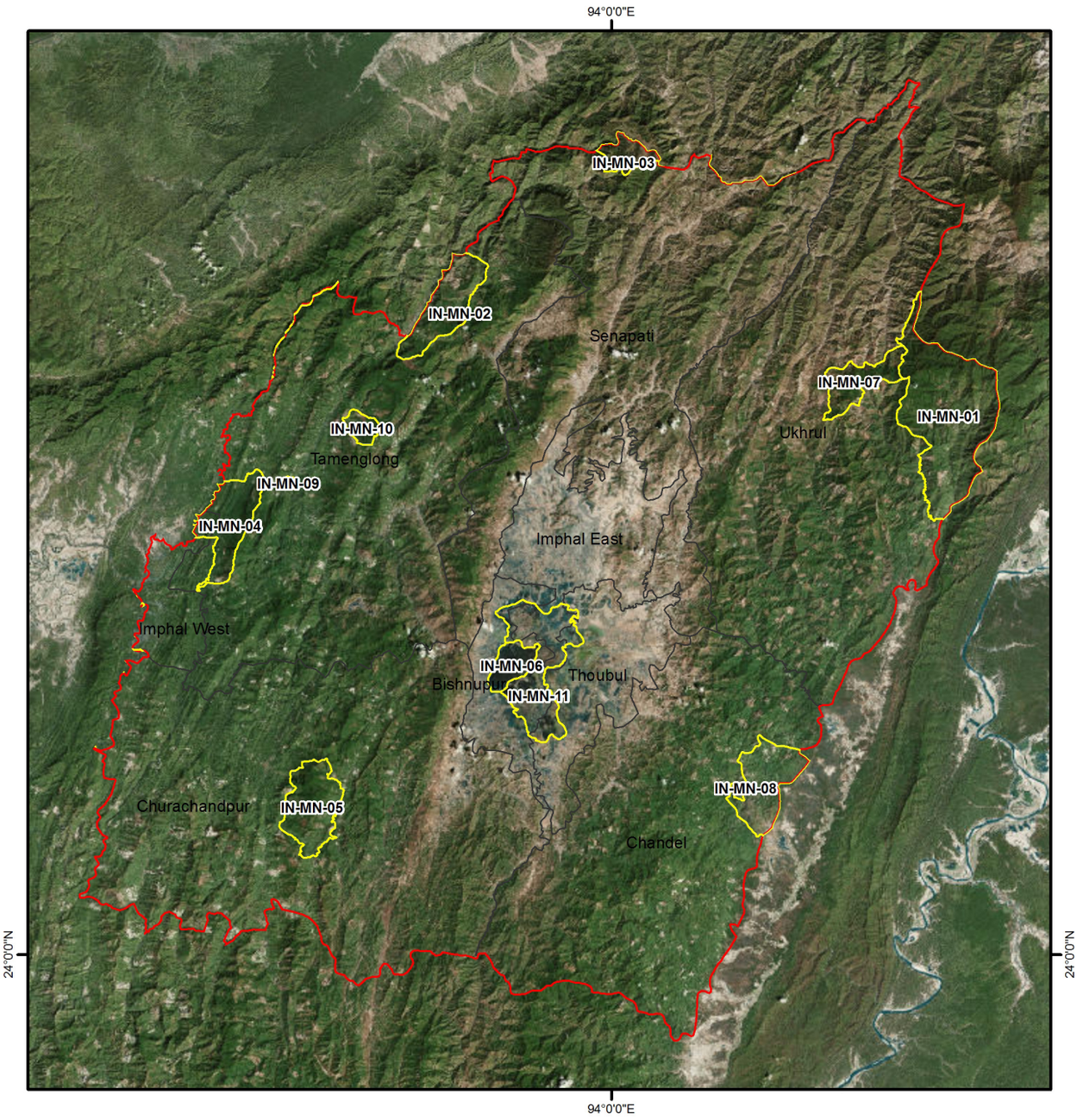
The temperature in the State varies from 2 °C to 38 °C and the annual rainfall ranges from 1,250 mm to 2,700 mm. The climate in most parts of the State is tropical whereas in the higher elevations it is subtropical.

As per the Census, the total human population of the State increased from 2.39 million in 2001 to 2.85 million in 2011 (0.2% of the country's population), of which 70.79% is rural and 29.21 urban, with an average population density of 115 persons per sq. km.

VEGETATION

The major forest types occurring in Manipur are Tropical

Important Bird Areas in Manipur



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Kilometers

Evergreen and Semi-Evergreen, Tropical Moist Deciduous, Subtropical Pine, Subtropical Broadleaf and small areas of Temperate Forests. Large stretches of bamboo forests are also found (Choudhury 1992). Manipur is ranked third amongst all the States in respect of the percentage of the State's geographical area recorded as forest area (Ministry of Environment and Forest 2013). As per the Forest Survey of India report of 2013, the recorded forest area of the State is 1,741,800 ha which constitutes 78% of the geographical area of the State and 2.3% of the country's forest area. According to legal classification, the reserved forest constitutes 8.4%, protected forest 23.9% and unclassed forest 67.7% (Ministry of Environment and Forest 2013). The Forest Survey of India report of 2013 states that the dense forest constitutes 30.55%, open forest 45.54% and non-forest 23.91% of the State's forest area. Manipur is one of the 15 states that have more than 33% forest cover. On the other hand, there has been a degradation of 218 sq. km of dense forest to open forest, mainly due to shifting cultivation called *jhum*.

IBAS AND PROTECTED AREAS

There is one national park (Keibul Lamjao) and five wildlife sanctuaries in Manipur. The total area under the protected area network is 26,660 ha, which is 1.19% of the geographical area of the State. Loktak lake with an area of around 20,000 ha, is a wetland of international importance. It has been designated as a Ramsar site. Nine IBAs were recognized in 2004 (Islam & Rahmani 2004). During the last ten years, four more IBAs have been identified (Birjit Singh & Kasambe 2015), making a total of 13 IBAs in Manipur.

AVIFAUNA

According to Choudhury (2009a), more than 607 species of birds have been identified in Manipur. However, in a recently published book with a checklist of birds reported from Manipur, a total of 666 bird species have been mentioned (Jugeshor 2014). Loktak Lake, a Ramsar site since 1990, is a prominent waterfowl area. Higgins (1933–34.) had documented the birds and mammals of Manipur, including birds shot/seen at the Loktak Lake. His list included the Greater White-fronted Goose *Anser albifrons* (recorded at least four times between 1916 and 1931: Higgins 1948), Falcated Duck *Anas falcata*, Baer's Pochard *Aythya baeri*, Scaup Duck (Greater Scaup) *Aythya marila*, Common Goldeneye *Bucephala clangula* and Common Shelduck *Tadorna tadorna*. In 1932, Higgins also shot a male Pink-headed Duck *Rhodonessa caryophyllacea*. The bird is now considered to be extinct and is listed as Critically Endangered (BirdLife International 2014). The Burmese Sarus Crane *Grus antigone sharpii*, once a breeding resident in the marshes of Loktak Lake, is now probably extinct locally as no authentic sighting has been reported in recent

RAJU KASAMBE

Although widespread, the Clouded Leopard *Neofelis nebulosa* is seldom seen as this secretive, nocturnal and lives in thick, closed canopy forest

IBAs of MANIPUR		
IBA site codes	**IBA site names**	**IBA criteria**
IN-MN-01	Ango or Anko Hills	A1, A2
IN-MN-02	Bunning Wildlife Sanctuary	A1, A2
IN-MN-03	Dzuku Valley	A1, A2
IN-MN-04	Jiri-Makru Wildlife Sanctuary	À1
IN-MN-05	Kailam Wildlife Sanctuary	A1, A2
IN-MN-06	Loktak Lake	A1, A4iii
IN-MN-07	Shiroi Community Forest	A1, A2
IN-MN-08	Yangoupokpi-Lokchao Wildlife Sanctuary	A1
IN-MN-09	Zeilad Lake Sanctuary	A1
IN-MN-10	Dailong Rongku Forest	A1, A2, A4iv
IN-MN-11	Keibul Lamjao National Park	A1, A4iii

LIST OF THREATENED BIRDS WITH IBA SITE CODES		
CRITICALLY ENDANGERED		
Baer's Pochard	*Aythya baeri*	IN-MN-06
ENDANGERED		
Manipur Bush-quail	*Perdicula manipurensis*	Not found in any IBA
Green Peafowl	*Pavo muticus*	IN-MN-01, 08
Yellow-breasted Bunting	*Emberiza aureola*	Not recorded in any IBA
VULNERABLE		
Lesser Adjutant	*Leptoptilos javanicus*	IN-MN-04, 06, 11(?)
Greater Spotted Eagle	*Clanga clanga*	IN-MN-06, 11
Pallas's Fish-eagle	*Haliaeetus leucorphus*	IN-MN-06, 11
Blyth's Tragopan	*Tragopan blythii*	IN-MN-01, 03, 07
Hooded Crane	*Grus monacha*	IN-MN-06, 11 (old records)
Sarus Crane	*Grus antigone*	IN-MN-06
Wood Snipe	*Gallinago nemoricola*	IN-MN-04
Dark-rumped Swift	*Apus acuticauda*	IN-MN-02, 03
Rufous-necked Hornbill	*Aceros nipalensis*	IN-MN-01, 02, 04, 05, 07, 10
Great Slaty Woodpecker	*Mulleripicus pulverulentus*	IN-MN-04
Grey-sided Thrush	*Turdus feae*	IN-MN-07
Slender-billed Babbler	*Turdoides longirostris*	IN-MN-02
NEAR THREATENED		
Spot-billed Pelican	*Pelecanus philippensis*	IN-MN-06,11
Oriental Darter	*Anhinga melanogaster*	IN-MN-06
Black-necked Stork	*Ephippiorhynchus asiaticus*	IN-MN-06, 11
Black-headed Ibis	*Threskiornis melanocepahlus*	IN-MN-06
Ferruginous Duck	*Aythya nyroca*	IN-MN-06, 09, 11
Falcated Duck	*Anas falcata*	IN-MN-06
Mrs. Hume's Pheasant	*Syrmaticus humiae*	IN-MN-01, 03, 05, 07, 08
White-cheeked Hill-partridge	*Arborophila atrogularis*	IN-MN-08
Himalayan Griffon	*Gyps himalayansis*	IN-MN-04, 08
River Lapwing	*Vanellus duvaucelii*	IN-MN-04
Eurasian Curlew	*Numenius arquata*	IN-MN-06
Black-tailed Godwit	*Limosa limosa*	IN-MN-06
River Tern	*Sterna acuticauda*	IN-MN-10
Red-breasted Parakeet	*Psittacula alexandri*	IN-MN-04, 05
Grey-headed Parakeet	*Psittacula finschii*	IN-MN-04, 10
Blossom-headed Parakeet	*Psittacula roseata*	IN-MN-04, 10
Ashy-headed Green-pigeon	*Treron phayrei*	IN-MN-04
Austen's Brown Hornbill	*Anorrhinus austeni*	IN-MN-01, 02, 04, 05, 09
Great Pied Hornbill	*Buceros bicornis*	IN-MN-01, 04, 05, 08, 09
Blackish-breasted Babbler (Sikkim Wedge-billed Babbler?)	*Sphenocichla humei*	IN-MN-03

BIRJIT SINGH

Asian Brown Tortoise *Manouria emys* is an Endangered species

years (Choudhury 1998). Choudhury (2009a) recorded more than eight White-rumped Vulture *Gyps bengalensis* in flight along with Slender-billed Vulture *Gyps tenuirostris* in Jiribam subdivision of Imphal East district near Assam-Manipur border in July 1989. There are no recent records.

Past records confirm the presence of the White-winged Duck *Asarcornis scutulata* but the species was always rare and there have been no recent sightings (Choudhury 1998). Austen's Brown Hornbill *Anorrhinus austeni* and Rufous-necked Hornbill *Aceros nipalensis* were reported by Choudhury (1998) at elevations higher than the previously recorded 'above 2,000 m'. Wreathed *Aceros undulatus* and Great Pied *Buceros bicornis* hornbills also occur, probably in good numbers. The Hooded Crane *Grus monacha*, of which only a handful of records are available for the entire Indian subcontinent (Ali & Ripley 1987), was a regular visitor in small numbers to Manipur (Higgins 1933–34). The only other area where they were seen was the North Cachar Hills of Assam (Choudhury 1998, 2000).

OTHER KEY FAUNA

Among mammals, primates like Western Hoolock Gibbon *Hoolock hoolock*, Bengal Slow Loris *Nycticebus bengalensis*, Assamese Macaque *Macaca assamensis*, Stump-tailed Macaque *Macaca arctoides*, and Capped Langur *Trachypithecus pileatus* are found in Manipur. The State is home to some globally threatened ungulates such as the Brow-antlered Deer *Rucervus eldii* (EN), Red Goral *Nemorhaedus baileyi* (VU), and Himalayan Serow *Capricornis thar* (NT). Brow-antlered Deer is the State Animal of Manipur and is locally known as *Sangai*. The State also holds a good number of carnivores including Tiger *Panthera tigris tigris*, Clouded Leopard *Neofelis nebulosa*, Asian Golden Cat *Catopuma temmincki*, Marbled Cat *Pardofelis marmorata*, Leopard Cat *Prionailurus bengalensis*, Spotted Linsang *Prionodon pardicolor*, Binturong *Arctictis binturong*, Asiatic Black Bear *Ursus thibetanus thibetanus*, Sun Bear *Helarctos malayanus* and Yellow-throated Marten *Martes flavigula* (Menon 2014). Vishwanath & Darshan (2009) reported the first occurrence of a catfish *Gagata dolichonema* from Manipur. Darshan *et al.* (2011) recorded a new species of catfish *Mystus ngasep* which is abundant in the waters of Manipur and was hitherto misidentified as *M. bleekeri*.

Threatened Birds for which Manipur is important

If we see the historical records of threatened birds, there are records of at least 56 threatened species from Manipur, including five Critically Endangered species, eight Endangered species, 16 Vulnerable and 27 Near Threatened species (Jugeshor 2014). These include the Oriental Stork *Ciconia boyciana*, Greater Adjutant *Leptoptilos dubius*, White-winged Duck *Asarcornis scutulata*, Spot-billed Pelican *Pelecanus philippensis*, Baer's Pochard *Aythya baeri*, Pallas's Fish-Eagle *Haliaeetus leucoryphus*, Greater Spotted

Eagle *Clanga clanga*, Manipur Bush-quail *Perdicula manipurensis*, Blyth's Tragopan *Tragopan blythii*, Mrs. Hume's Pheasant *Syrmaticus humiae*, Green Peafowl *Pavo muticus*, Sarus Crane *Grus antigone*, Hooded Crane *Grus monacha*, Masked Finfoot *Heliopais personatus*, Wood Snipe *Gallinago nemoricola*, Pale-capped Pigeon (Pale-capped Woodpigeon) *Columba punicea*, Rufous-necked Hornbill *Aceros nipalensis*, Grey-sided Thrush *Turdus feae*, Tawny-breasted Wren-babbler *Spelaeornis longicaudatus*, Slender-billed Babbler *Turdoides longirostris*, and Beautiful Nuthatch *Sitta formosa*. If proper surveys are conducted, some of these species could be found even now.

Brief information about important threatened species in Manipur is given below. Most of these records are historical and very few species have recent records because no detailed surveys have been carried out in the recent past owing to insurgency issues in the State.

Manipur Bush-Quail *Perdicula manipurensis*
Endangered

The specialised habitat of this poorly-known species is undergoing a rapid decline and severe fragmentation, adversely affecting the population of the species. In addition, there have been no confirmed records of the bird since 1932, indicating it may have a small population. These factors, combined with the ongoing hunting pressures across its range, qualify it as Endangered (BirdLife International 2014). In Manipur, this quail was recorded from the Manipur valley in 1899 and 1932 (Higgins 1933–1934); in Imphal in 1906 (Powell Connor 1908); in the Churachandpur region in 1913 (Higgins 1913). The IBCN and its local partner, Center for Conservation of Nature and Cultivation of Science (CCNCS), have been trying to locate this bird in Manipur since 2013 but with little success till date (Raju Kasambe, *pers. obs.* 2015).

Blyth's Tragopan *Tragopan blythii*
Vulnerable

This species qualifies as Vulnerable because its total population is believed to be small and declining, and is scattered in small subpopulations over a severely fragmented range. Widespread hunting and continuing habitat destruction will inevitably exacerbate this situation (BirdLife International 2001). In Manipur, the species has been reported from the Dzuko Valley and Siroi Hills (Choudhury 1992) where it is apparently commonly trapped (Choudhury 1996). It occurs in the higher hills, usually above 1,800 m. The Siroi area in Ukhrul district and the Barail Range in Tamenglong and Senapati districts are their main strongholds in Manipur.

Mrs. Hume's Pheasant *Syrmaticus humiae*
Near Threatened

Mrs. Hume's Pheasant is the State Bird of Manipur and is locally called '*Nongin*' or *Loining-koi* or *Noining-koi*. This colourful species is poorly known and appears to have been reduced to a small population, which has become increasingly fragmented. The bird is listed under Near Threatened as it has a moderately small, declining and fragmented population (BirdLife International 2014). In Manipur it has been recorded from the southern slopes of the Dzuku Valley and Siroi Hills (Choudhury 1992). Another area where this pheasant could be seen is the Thoubal valley (the Thoubal river is a tributary of the Manipur river) (Ali and Ripley 1987). Choudhury (2009b) carried out surveys in Manipur and concluded that the bird was widely distributed in the hills of northeastern Manipur, located in Ukhrul district and northeastern areas of Senapati district. It was rare in Barail range and sparsely distributed in the higher hills of Churachandpur and Chandel. It was also found near the Barak river in Tamenglong district. This species prefers lower elevations between 900 to 2,000 m. R.K. Ranjan Singh conducted a pilot survey during August 14–20, 2010 in Ukhrul, Senapati and Chandel districts (Singh 2012). Two sites selected from this survey were Shiroi village near Ukhrul town and Razai Khullen bordering Myanmar and Nagaland. However, the survey did not result in any actual sightings of the species.

ENDEMIC BIRD AREA 130: EASTERN HIMALAYAS		
Blyth's Tragopan	*Tragopan blythii*	IN-MN-01, 03, 07
Dark-rumped Swift	*Apus acuticauda*	IN-MN-03
Striped Laughingthrush or Variegated Laughingthrush	*Garrulax virgatus (=Trochalopteron virgatum)*	IN-MN-03
Brown-capped Laughingthrush	*Garrulax (=Lanthocincla) austeni*	IN-MN-03
Blackish-breasted Babbler (Sikkim Wedge-billed Babbler)	*Sphenocichla humei*	IN-MN-03
Streak-throated Barwing	*Actinodura waldeni (=Ixops waldeni)*	IN-MN-03
Grey Sibia	*Heterophasia gracilis (=Malacias gracilis)*	IN-MN-01, 02, 03, 05, 07
White-naped Yuhina	*Yuhina bakeri*	IN-MN-03

BIRJIT SINGH

Slender-billed Babbler *Turdoides longirostris* is globally Vulnerable species mainly found in grasslands and thickets

Green Peafowl *Pavo muticus*
Endangered

This majestic species has a small, rapidly declining and severely fragmented population, primarily owing to high hunting levels, although it has also suffered a reduction in the extent and quality of its habitat. Rapid decline and further fragmentation are projected to continue. These factors qualify it as Vulnerable (BirdLife International 2001). From Manipur, it was recorded from the extreme north of the Manipur valley in 1928 (Higgins 1933–1934) and along the Myanmar border and in Churachandpur district in 1990 (Choudhury 1992). This species was once widespread in the forested areas of northeast India, especially south of the Brahmaputra river. Quite a number of Green Peafowl are present in the Imphal Zoo, apparently collected from the Chandel district bordering Myanmar. In the villages located in the southeastern areas of Ukhrul district, some peafowl are kept as pets by villagers who hatch them from eggs collected in the wild (Choudhury 1998). Devi (2013) states that the bird is still occasionally seen in Yangoupokpi-Lokchao Wildlife Sanctuary.

Restricted Range species

Manipur falls under the Endemic Bird Area of Eastern Himalaya (EBA 130), and accounts for 21 restricted range species in India (Stattersfield *et al*. 1998). The key habitats of this EBA are Subtropical Hill Forest, Temperate Forest, and Subalpine Forest. The key threats to these areas are moderate habitat loss (e.g., due to logging, *jhumming*, overgrazing) and hunting. Only five IBAs fulfill this A2 (Restricted Range species) criterion.

Biomes

In Manipur, three biomes are found: Biome-7 (Sino-Himalayan Temperate Forest), with key habitats of Broadleaf Evergreen Forest, Broadleaf Deciduous, Mixed Broadleaf-Coniferous and Coniferous Forest and Montane Grassland; Biome-8 (Sino-Himalayan Subtropical Forest) which has Lower Montane Rain Forest, Hill Evergreen Forest and Pine Forest as key habitats; and Biome-9 (Indo-Chinese Tropical Moist Forest) which has Lowland Evergreen Rain Forest, Semi-Evergreen Rain Forest and Moist Deciduous Forest. A total of 226 bird species are found in the three biomes as per BirdLife International (undated).

Some new records to Manipur

Wallcreeper *Tichodroma muraria*

Choudhury (2004) saw a Wallcreeper on a barren cliff on the way from Imphal (Manipur) to Hailakandi (Assam), between Keithelambi and Tupul in Senapati

BIRJIT SINGH

BIRJIT SINGH

Unfortunately hunting of birds and all other species is still very common in Manipur. Environmental education programme from school level to the authorities needs to be implemented.

district. This was reported as the first record for Manipur.

Mandarin Duck *Aix galericulata*

Kasambe & Singh (2014) carried out a survey of IBAs in Manipur. During their visit to Loktak Lake on December 11, 2013 they spotted a brightly coloured duck among the flock of ducks. Further observations and photography revealed it to be Mandarin Duck. This was the first record of the bird in the wild after 1934 in Manipur.

Eastern Imperial Eagle *Aquila heliaca* Vulnerable

A single bird was seen and photographed soaring in the sky during an IBA survey on December 17, 2013 in the Manipur valley (Raju Kasambe, *pers. obs.* 2013). This could be the first record of the species from Manipur.

THREATS AND CONSERVATION ISSUES

Besides habitat destruction, hunting and poaching are the major reasons for the scarcity of wildlife in Manipur. The hill tribes like the Nagas, the Kukis and the Mizos are all avid hunters and hardly spare any wildlife. All types of wild animals and birds are hunted, from large galliformes, hornbills, to deer and primates. Even elephants are hunted for meat. There is a great need for environmental awareness, especially among those living around IBAs and protected areas. During an IBA survey in December 2013, boys were seen hunting birds using slingshots, adolescents were seen hunting birds using air guns and adult men were seen carrying guns for hunting (Raju Kasambe, *pers. obs.* 2014).

Jhumming or shifting cultivation is the biggest cause of the destruction of the natural forest. *Jhum* cultivation should be controlled. No *jhum* should be allowed in the remaining pockets of the primary forests, on steep slopes and above the elevation of 1,500 m (Choudhury 1998). Manipur has the highest allocation of *jhum* control fund from the Government of India. Both NGOs and the State government should ensure that this fund is properly utilised and it further helps the remaining pockets of the forests.

Logging of timber and collection of non-timber forest produce are potential threats. At the Bunning Wildlife Sanctuary, community conflict and establishment of villages within the Sanctuary area have caused damage to the Sanctuary (A.U. Choudhury *pers. comm.* in 2003). Protection measures in the existing protected areas such as Keibul Lamjao and Yangoupokpi-Lokchao should be strengthened. Illegal tree felling is rampant in Yangoupokpi-Lokchao for producing charcoal and for timber. Advanced machinery like the electrical saws are used for tree felling, and powerful SUVs (special utility vehicles), locally called 'Shaktiman', are used for transportation of timber in the remote hilly parts of the forests (Raju Kasambe, *pers. obs.* 2013).

According to A.U. Choudhury, in the Dzuko Valley hunting has been a part of life for the tribes living around the area but now they have taken the initiative to stop hunting. This is already having a positive effect on the wildlife. Seasonal fires destroy some parts of the habitat every year. An increasing number of trekkers and tourists are aggravating the problem of non-degradable solid waste. Many tourists indiscriminately collect the endemic Dzuko Lily *Lilium chitrangadae,* which is confined to this small valley.

Siroi (Shiroi) Hill is the only known home of the Siroi Lily *Lilium macklineae*, and the sentiments and emotions of the local people are closely attached to this flower. Siroi Lily is the State Flower of Manipur and is found only in Siroi Hills. Uncontrolled visits by tourists and collection of the Lily has led to its severe decline (Salam Rajesh *pers. comm.* 2003). Protecting this flower and the Siroi Hill will also protect the threatened birds found in and around this Hill. Though the Siroi villagers tried to protect the area as community reserve, hunters from nearby villages intrude

into these areas and indulge in rampant hunting. This has resulted into failing the conservation attempts of the Siroi village people (Raju Kasambe, *pers. obs.* 2013).

Eye-browed Thrush *Turdus obscurus* is killed in large numbers by villagers during winter with glued sticks (Choudhury 1998). The local people could be motivated against it by making them aware of the need to protect this species. Since Siroi Hill is not a protected area, conservation efforts should be initiated by NGOs with the help of the community leaders.

The Loktak Lake ecosystem has changed considerably after the construction of a multipurpose hydel and irrigation project at Ithai. The natural wetland with fluctuating water level has been converted to a reservoir with more or less constant water level. Besides bringing about basic hydrological changes, this has resulted in severe problems for the lake biota and the communities traditionally dependent on it. Loktak has, therefore, been placed in the Montreaux record, a list of internationally important wetlands (Ramsar Sites) that have undergone or are undergoing significant changes in their ecological character. Loktak is also threatened by excessive loading of silt and nutrients from various anthropogenic sources. Deforestation, shifting cultivation, uncontrolled use of fertilisers in agricultural lands, and discharge of domestic wastes, all contribute to the input of silt and nutrients into the lake. This will accelerate the ageing of the lake by rapid siltation and excessive biomass production.

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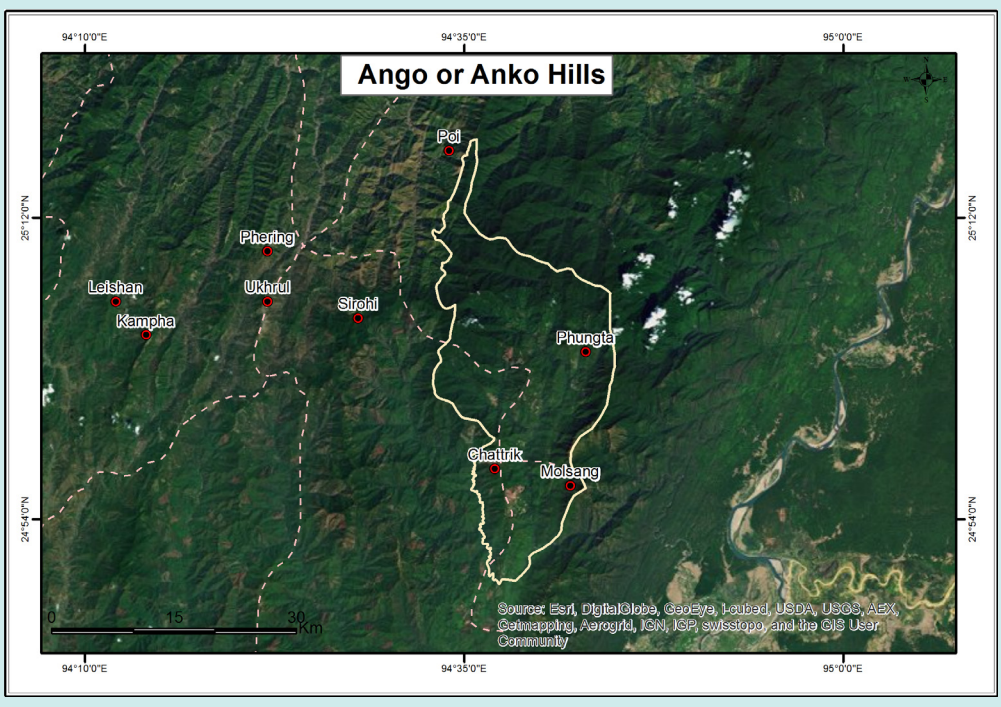
ANGO (ANKO) HILLS

IBA Site code	:	IN-MN-01	**Rainfall**	: >2,000 mm
State	:	Manipur	**Temperature**	: 4 °C to 33 °C
District	:	Ukhrul	**Biogeographic Zone**	: Northeast
Coordinates	:	25° 13' 00" N, 94° 34' 00" E	**Habitats**	: Tropical Semi-evergreen Forest, Tropical Dry Evergreen Forest, Sub-tropical Broadleaf Hill Forest
Ownership	:	Community		
Area	:	88,00 ha please check		
Altitude	:	500–2,000 msl		

IBA CRITERIA: A1 (Threatened species), A2 (Endemic Bird Area 130: Eastern Himalaya)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

The Ango or Anko Hills lie on the Indo-Myanmar border, nearly 8 km from Poi village in Ukhrul district, northeast Manipur. Most of the range is in Myanmar, however, the north-western part lies within India. Owing to its remoteness, the area is largely undisturbed. The local community is also inclined to give it some protection. The forests are of Moist Subtropical and Tropical Evergreen types. The geographical area presently occupied by this IBA is hardly 8,000 ha, as the rest of the area, i.e. 31,200 ha, is under Myanmarese occupation.

The flora and fauna are poorly known, however, the Green Peafowl *Pavo muticus*, Rufous-necked Hornbill *Aceros nipalensis* (Anwaruddin Choudhury *pers. comm.* 2003), Mrs. Hume's Pheasant *Syrmaticus humiae*, Black-necked Stork *Ephippiorhynchus asiaticus*, and Himalayan Griffon *Gyps himalayensis* are reported from this site.

AVIFAUNA

The birdlife of the Anko range is not very well known. This site lies in the Eastern Himalaya Endemic Bird Area (EBA 130), identified by Stattersfield *et al.* (1998) and BirdLife International (undated). This EBA is one of the bird-rich areas of India, with 21 restricted-range species, and a total of 114 bird species typical of Biome 8 (Sino-Himalayan Subtropical Forest) and Biome 7 (Indo-Chinese Tropical Moist Forest).

Ango Hills is one of the two IBAs in India where the Green or Burmese Peafowl is found, hence it is extremely important for conservation. Historically, the Green Peafowl was distributed widely from northeast India to southern China, Myanmar, Thailand, Laos, Vietnam, and

Cambodia (BirdLife International 2001). It persists in all these countries except Malaysia and Bangladesh, but it has certainly declined and now only occurs in fragmented, greatly reduced populations. Earlier its world population in the wild was estimated to be 5,000 to 10,000 individuals (McGowan & Garson 1995) but now BirdLife International (2014) estimates that between 10,000 and 20,000 birds could be present. In India, it was formerly distributed on the southern banks of the Brahmaputra river from Nagaon to Cachar districts, but now it is restricted to east Manipur (Choudhury 2000). Therefore, protection of this IBA is an urgent need.

BirdLife International (2001) has listed only four sites in Manipur for Mrs. Hume's Pheasant *Syrmaticus humei*. However, Choudhury (2002) has identified 11 more sites for this State Bird of Manipur.

Four species of hornbills are found: the globally Threatened Rufous-necked Hornbill *Aceros nipalensis*, Near Threatened Great Pied Hornbill *Buceros bicornis* and Austen's Brown Hornbill *Anorrhinus austeni*, and the much commoner Oriental Pied Hornbill *Anthracoceros albirostris*. The Wreathed Hornbill *Aceros undulatus* is also likely to occur (Anwaruddin Choudhury, *pers. comm*. 2003).

OTHER KEY FAUNA

Among the mammals, the Sumatran Rhinoceros *Dicerorhinus sumatrensis* is noteworthy (Choudhury 1997). Villagers of Konkan, which is *c*. 88 km by road from Ukhrul town, encountered stray individuals in the early 1990s (Aleng, *pers. comm*. to Choudhury 1997). In the 1970s, a rhino was shot by the Tangkhul Naga tribe (known as the Somra tribe in Myanmar) of Khamsong village, northeast of Ukhrul town. If it is proved that this Critically Endangered mammal still exists in the area, the site would need special protection.Although there is no recent report of rhino, the pristine habitat in the area still deserves protection.

Seven species of primates are found in the area: the Assamese Macaque *Macaca assamensis*, Rhesus Macaque *M. mulatta*, Stump-tailed Macaque *M. arctoides*, Pig-tailed Macaque *M. nemestrina*, Capped Langur *Trachypithecus pileata*, Western Hoolock Gibbon *Hoolock hoolock*, and Slow Loris *Nycticebus bengalensis*. Among the carnivores, Tiger *Panthera tigris* (occasional), Leopard *P. pardus*, Clouded Leopard *Neofelis nebulosa*, Golden Cat *Catopuma temminckii*, Dhole or Wild Dog *Cuon alpinus*, Malayan Sun Bear *Helarctos malayanus*, and Asiatic Black Bear *Ursus thibetanus* are found. Wild Boar *Sus scrofa*, Sambar *Rucervus unicolor*, Indian Muntjac or Barking Deer *Muntiacus muntjak*, Gaur *Bos frontalis*, Chinese or Long-tailed Goral *Naemorhedus griseus*, and Red Serow *Capricornis rubidus* are the major ungulates found in the area (Choudhury 2013).

ENDANGERED	
Green Peafowl	*Pavo muticus*
VULNERABLE	
Blyth's Tragopan	*Tragopan blythii*
Rufous-necked Hornbill	*Aceros nipalensis*
NEAR THREATENED	
Mrs. Hume's Pheasant	*Syrmaticus humei*
Great Pied Hornbill	*Buceros bicornis*
Austen's Brown Hornbill	*Anorrhinus tickelli*
ENDEMIC BIRD AREA 130: EASTERN HIMALAYA	
Blyth's Tragopan	*Tragopan blythii*
Grey Sibia	*Heterophasia gracilis*

LAND USE

- Forestry

THREATS AND CONSERVATION ISSUES

- Poaching
- Collection of forest produce
- Slash and burn cultivation

The local community has recently shown some interest in conserving this important area. However, logging of timber and collection of non-timber forest produce are potential threats. Hunting of wild animals is a traditional occupation of the local community. There is an urgent need to survey the area for a detailed biodiversity inventory.

KEY CONTRIBUTORS

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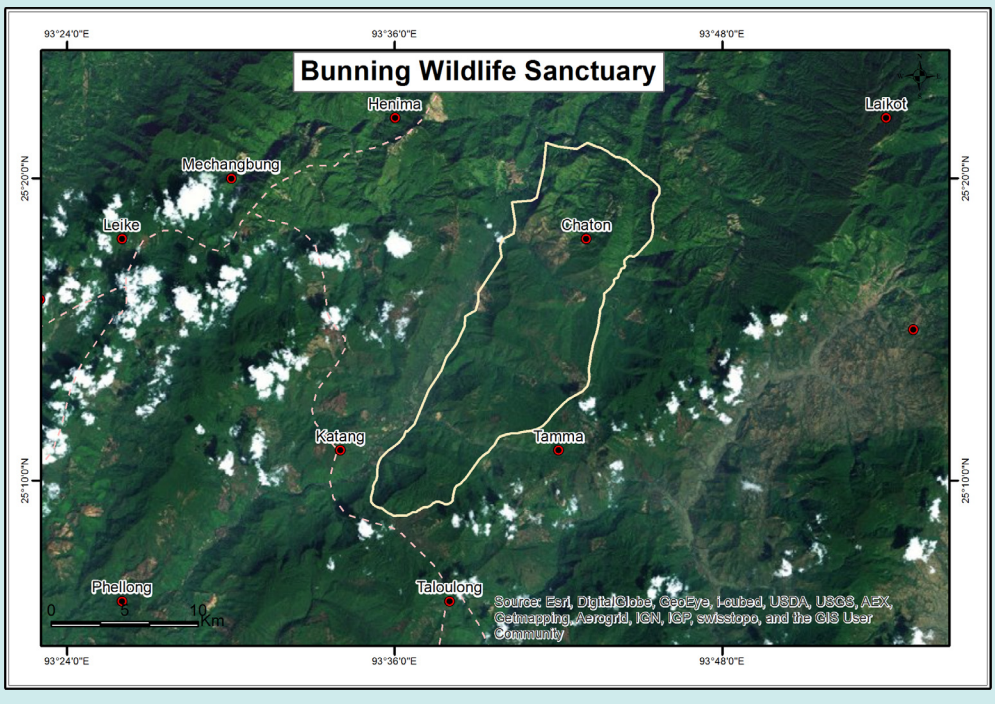
BUNNING WILDLIFE SANCTUARY

IBA Site Code	:	IN-MN-02	**Altitude**	:	1,000–1,800 msl
State	:	Manipur	**Rainfall**	:	>1,500 mm
District	:	Tamenglong	**Temperature**	:	2 °C to 33 °C
Coordinates	:	25° 04' 19" N, 93° 31' 51" E	**Biogeographic Zone**	:	Northeast
Ownership	:	State	**Habitats**	:	Montane Wet Temperate Forest, Tropical Dry Evergreen Forest
Area	:	11,580 ha			

IBA CRITERIA: A1 (Threatened species), A2 (Endemic Bird Area 130: Eastern Himalaya)

PROTECTION STATUS: Wildlife Sanctuary, established 1997.



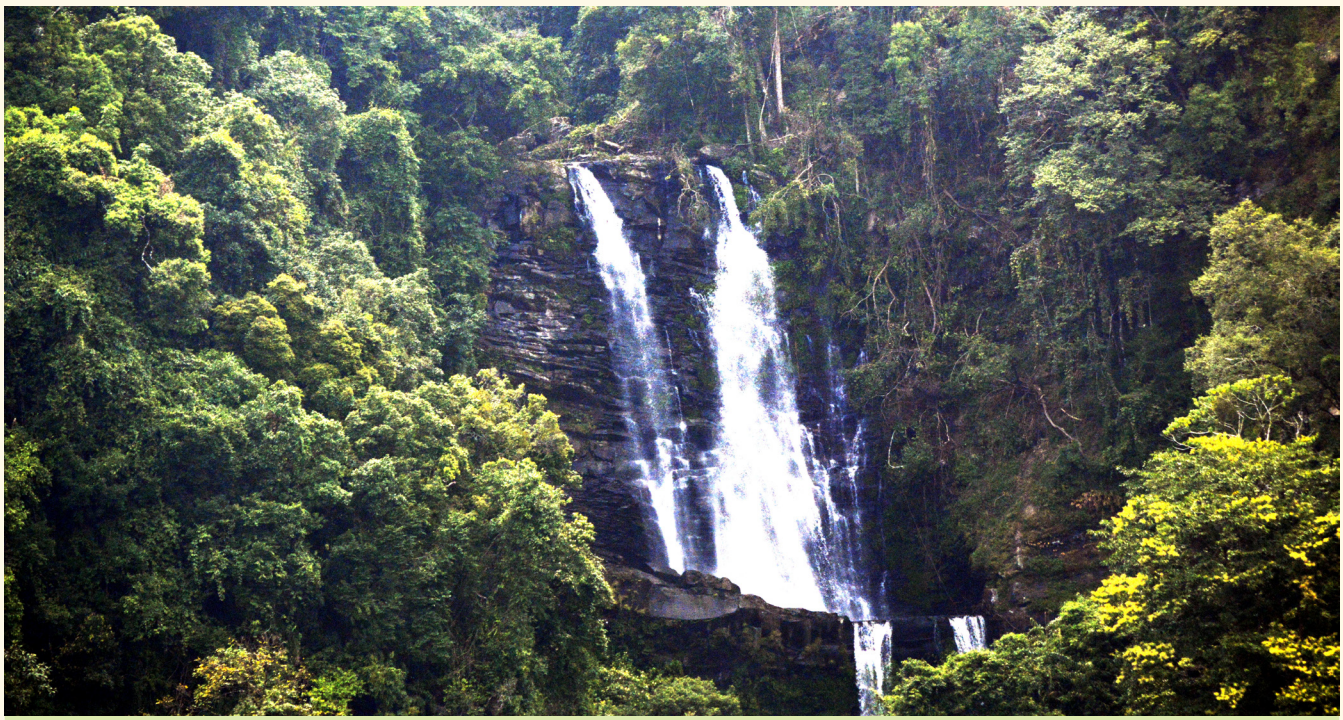
GENERAL DESCRIPTION

Bunning WLS is located in the Tamei subdivision in Tamenglong district, and is part of the Barail Range. The Barak river flows near the sanctuary. Many streams originate from the catchment areas within the sanctuary and feed the Barak. Tropical Evergreen and Semi-evergreen Forests occur in this IBA. The scenic beauty of the valley with its small dome-shaped hillocks is worth seeing. The site is poorly known and should be given priority for a biodiversity survey.

AVIFAUNA

Detailed information on avifauna from Bunning WLS is lacking. However, some of its biome-restricted species are as follows (Anwaruddin Choudhury, *pers. comm.* 2003): Rufous-bellied Niltava *Niltava sundara*, Brown Hornbill *Anorrhinus tickelli*, Golden-throated Barbet *Megalaima franklinii*, Blue-throated Barbet *M. asiatica*, Bay Woodpecker *Blythipicus pyrrhotis*, Maroon Oriole *Oriolus traillii*, Himalayan Treepie *Dendrocitta formosae*, White-throated Bulbul *Alophoixus flaveolus*, Grey Peacock-pheasant *Polyplectron bicalcaratum*, and Pale-headed Woodpecker *Gecinulus grantia.*

Among the globally Threatened species, Rufous-necked Hornbill *Aceros nipalensis* (VU) is found here (Anwaruddin Choudhury, *pers. comm.* 2003). Another bird of conservation interest is the Grey Sibia *Heterophasia gracilis*, considered to be a restricted-range species by Stattersfield *et al.* (1998). This IBA is included in the Eastern Himalaya Endemic Bird Area (EBA 130). This part of the Himalaya is particularly rich in restricted-range birds, and the genus *Sphenocichla* is endemic to it. The area is a known biodiversity hotspot, but a systematic survey, particularly for avian species is yet to be conducted.



R.K. BIRJIT SINGH

Bunning Wildlife Sanctuary falls in the Eastern Himalaya Endemic Bird area (EBA 130). BirdLife International has identified 21 restricted range species from this EBA. Till now Grey sibia has been reported from Bunning but more restricted range species are likely to be found here

OTHER KEY FAUNA

This sanctuary has most of the mammalian elements of the Northeast, such as the Tiger *Panthera tigris* (now occasional), Leopard *P. pardus*, Clouded Leopard *Neofelis nebulosa*, Golden Cat *Catopuma temminckii*, Asiatic Elephant *Elephas maximus* (rare visitor but now probably extirpated), Malayan Sun Bear *Helarctos malayanus*, Asiatic Black Bear *Ursus thibetanus*, and Dhole or Wild Dog *Cuon alpinus*. Among primates, Slow Loris *Nycticebus bengalensis*, Hoolock Gibbon *Hoolock hoolock*, Rhesus Macaque *Macaca mulatta*, Stump-tailed Macaque *M. arctoides*, Pig-tailed Macaque *M. nemestrina*, Assamese Macaque *Macaca assamensis*, and Capped Langur *Trachypithecus pileatus* are noteworthy. Gaur *Bos gaurus*, Wild Boar *Sus scrofa*, Sambar *Rusa unicolor*, Indian Muntjac or Barking Deer *Muntiacus muntjak*, Chinese or Long-tailed Goral *Naemorhedus griseus*, and Red Serow *Capricornis rubidus* are the major ungulates found in the area (Choudhury 2013).

Important reptiles and amphibians include Indian Leaf Turtle *Cyclemys gemeli*, Asian Brown Tortoise *Manouria emys*, Assam Roofed Turtle *Pangshurs sylhettensis*, Bengal Monitor *Varanus bengalensis*, Red-necked Keelback *Rhabdophysis subminiatus*, and Burmese Python *Python molurus bivittatus*. The endemic Pitcher plant *Nepenthes khasiana* has been recently reported from this area (R.K. Birjit Singh 2012, *pers. comm* 2015).

VULNERABLE	
Rufous-necked Hornbill	*Aceros nipalensis*
Dark-rumped Swift	*Apus acuticauda*
Slender-billed Babbler	*Turdoides longirostris*
NEAR THREATENED	
Brown Hornbill	*Anorrhinus austeni*
ENDEMIC BIRD AREA 130: EASTERN HIMALAYA	
Grey Sibia	*Heterophasia gracilis*

LAND USE

- Forest
- Agriculture
- *Jhum* cultivation

THREATS AND CONSERVATION ISSUES

- Community conflict and establishment of villages within the sanctuary area
- Slash and burn cultivation
- Rampant poaching

KEY CONTRIBUTORS

R.K. Birjit Singh, Raju Kasambe, L. Shamungou Singh, Salam Rajesh, W. Rajesh Singh, R.K. Ranjan Singh, Anwaruddin Choudhury, M. Firoz Ahmed, Kulojyoti Lahkar.

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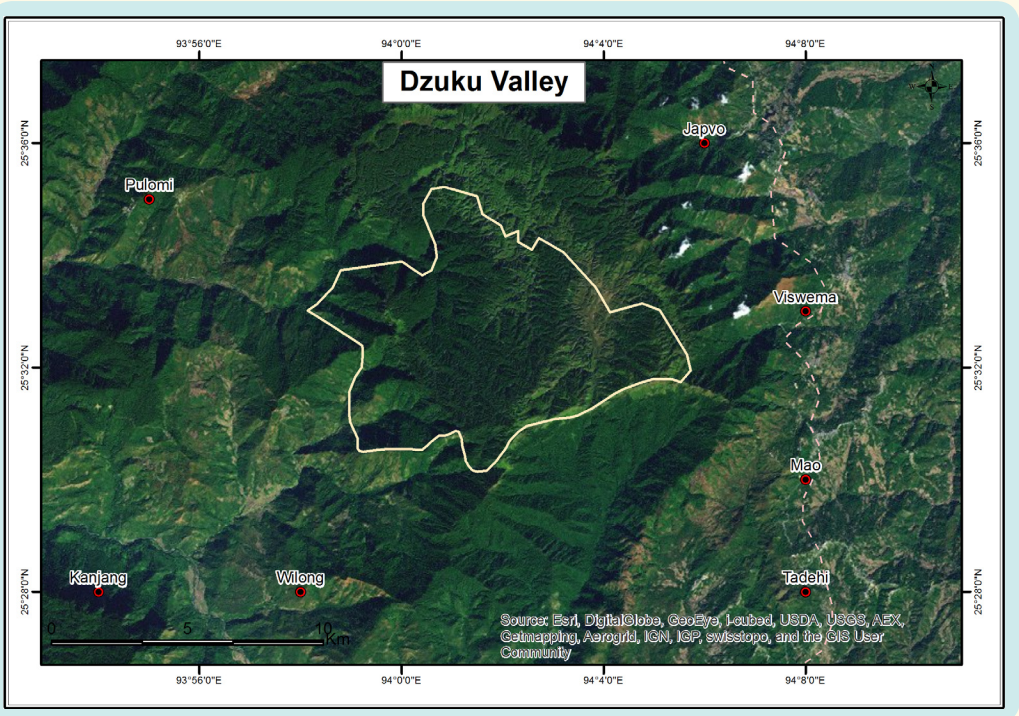
DZUKU VALLEY

IBA Site Code	:	IN-MN-03	**Altitude**	:	1,500–2,990 msl
State	:	Manipur	**Rainfall**	:	>2,000 mm
District	:	Senapati	**Temperature**	:	0 °C to 25 °C
Coordinates	:	23° 31' 05" N, 93° 48'15" E	**Biogeographic Zone**	:	Northeast
Ownership	:	Community	**Habitats**	:	Sub-tropical Broadleaf Hill Forest, Montane Wet Temperate Forest
Area	:	2,500 ha			

IBA CRITERIA: A1 (Threatened species), A2 (Endemic Bird Area 130: Eastern Himalaya)

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

The Dzuku Valley with its surrounding hill ranges is one of the biodiversity-rich ecosystems in the northeast region of India. Itis a naturally beautiful area with lilies in white and pink, euphorbias, aconitums, and hundreds of other botanical species in varied colours adorning the valley between the borders of Nagaland and Manipur, where the Dzuku, a tributary of the Barak river, flows through. The hills are uniformly covered with short and tall bamboo, grasses, and other flora. Some of the hillocks have Broadleaf Temperate Forest, providing habitats for Blyth's Tragopan *Tragopan blythii* and other birds of tropical forests. Dzuku is famous for the Dzuku Lily *Lilium chitrangadae*, which is endemic to the Dzuku Valley. The valley receives tremendous numbers of local tourists during the flowering season.

During winter, the slow moving Dzuku river is covered with a thin layer of ice (Ranjan Singh 1995). The name Dzuku, meaning frozen water, is derived from the *Mao Pukmai* language (*dzu* = cold or frozen, *ku* = water)

The Dzuku Valley has a cold temperate climate with severe winter, and heavy rainfall during the monsoon (Ranjan Singh 1995).

Dzuku is contiguous with two other IBAs of Nagaland, Khonoma Nature Conservation and Tragopan Sanctuary, and Pulie Badze-Japfu-Dzuku. Altogether, these three IBAs [Dzuku, Khonoma and Pulie Badze-Japfu constitutes *c.* 20,000 ha of subtropical rain forest. The Tenipu peak (also called Mt. Iso) rises to 2,990 m and is the highest peak in Manipur.

AVIFAUNA

Detailed information on the avifaunal diversity of this

VULNERABLE	
Blyth's Tragopan	*Tragopan blythii*
Khasi Hills Swift	*Apus acuticauda*
NEAR THREATENED	
Mrs. Hume's Pheasant	*Syrmaticus humiae*
Blackish-breasted Babbler	*Sphenocichla humei*
ENDEMIC BIRD AREA 130: EASTERN HIMALAYA	
Blyth's Tragopan	*Tragopan blythii*
Khasi Hills Swift	*Apus acuticauda*
Striped Laughingthrush	*Garrulax virgatus*
Brown-capped Laughingthrush	*Garrulax austeni*
Blackish-breasted Babbler	*Sphenocichla humei*
Austen's Barwing	*Actinodura waldeni*
Grey Sibia	*Heterophasia gracilis*
White-naped Yuhina	*Yuhina bakeri*

site is not available. The site, however, supports a good population of Blyth's Tragopan *Tragopan blythii* that occurs in the subtropical and temperate broadleaf forests. The villagers have shown interest in protecting Blyth's Tragopan (Firoz Ahmed, *pers. comm*. 2003).

A small breeding colony of the Khasi Hills or Dark-rumped Swift *Apus acuticauda* has been discovered in Khonoma-Dzuku of Nagaland (Ahmed *et al*. 2003). Hence, it could occur in Dzuku area of Manipur. A thorough investigation is required.

On the southern slopes of Barail range in Manipur there are records of Mrs. Hume's Pheasant *Syrmaticus humiae* (Choudhury 2002). However, it has become very rare in the area, and may disappear unless urgent measures are taken for its protection.

Dzuku IBA is included in the Eastern Himalaya Endemic Bird Area (EBA 130), identified by Stattersfield *et al*. (1998) and BirdLife International (undated). This is one of the bird-rich areas of India, with a total of 21 restricted-range species. Most parts of this IBA belong in Biome 8 (Sino-Himalayan Subtropical Forest), with only a small portion having Biome-7 (Sino-Himalayan Temperate Forest). A total of 207 species of these biomes have been listed by BirdLife International (undated). Detailed studies are required to find out how many of these biome species are found in Dzuku Valley.

The biome species recorded from nearby Khonoma Nature Conservation and Tragopan Sanctuary, which are likely to occur here are: Rufous-breasted Accentor *Prunella strophiata*, Stripe-throated Yuhina *Yuhina gularis*, Rufous-bellied Niltava *Niltava sundara*, Mountain Bamboo partridge *Bambusicola fytchii*, Blue-throated Barbet *Megalaima asiatica*, Mountain Bulbul *Hypsipetes mcclellandii*, Maroon Oriole *Oriolus traillii*, Small Minivet *Pericrocotus cinnamomeus*, and Fire-tailed Sunbird *Aethopyga ignicauda*.

OTHER KEY FAUNA

Like most forests of Manipur, hunting was rampant till a few years ago, so sighting of animals was rare, but after the villagers decided to stop hunting, the wildlife is recovering. Some of the species found here are Leopard *Panthera pardus*, Clouded Leopard *Neofelis nebulosa*, Asiatic Black Bear *Ursus thibetanus*, Capped Langur *Trachypithecus pileatus*, Stump-tailed Macaque *Macaca arctoides*, and Red Serow *Capricornis rubidus*. Asiatic Elephant *Elephas maximus*, which used to visit the area every summer, has stopped doing so for the last three decades. The reptile and amphibian fauna appears to be very rich, but little work has been done on it (Anwaruddin Choudhury, *pers. comm*. 2014).

LAND USE

- Forest
- Tourism and recreation
- Watershed development

THREATS AND CONSERVATION ISSUES

Hunting has been a way of life for the tribes living around the area, but now they have taken the initiative to stop hunting. This is already having a positive effect on the wildlife. Seasonal fires destroy some parts of the habitat every year. Trekkers and other tourists are increasing, and with them the problem of non-degradable solid waste. Many tourists indiscriminately collect the beautiful Dzukou Lily which is endemic to this small valley.

There is a need to conduct periodic biodiversity status surveys to assess the impact of community conservation measures.

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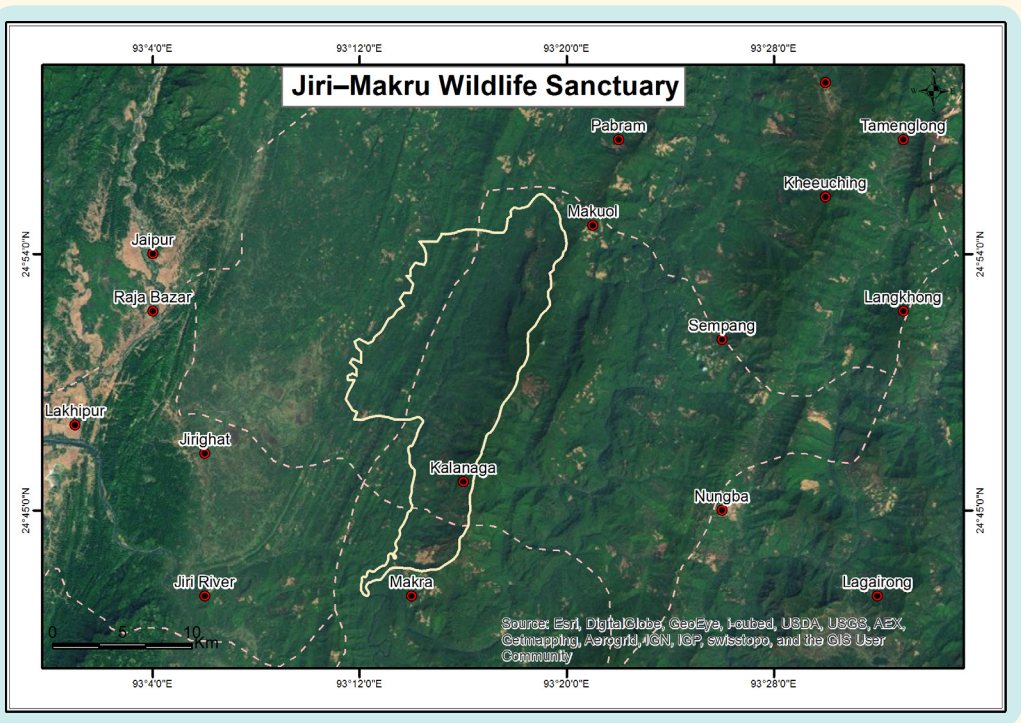
JIRI-MAKRU WILDLIFE SANCTUARY

IBA Site Code	:	IN-MN-04	**Altitude**	:	80–500 msl
State	:	Manipur	**Rainfall**	:	2,500–3,500 mm
District	:	Tamenglong	**Temperature**	:	7 °C to 35 °C
Coordinates	:	24° 50' 45" N, 93° 17' 29" E	**Biogeographic Zone**	:	Northeast
Ownership	:	State	**Habitats**	:	Tropical Wet Evergreen Forest, Tropical Semi-evergreen Forest
Area	:	19,800 ha			

IBA CRITERIA: A1 (Threatened species), Data Deficient

PROTECTION STATUS: Wildlife Sanctuary, established 1997.



GENERAL DESCRIPTION

This site is located between the Jiri and Makru rivers, both tributaries of the Barak river near the Assam-Manipur border. It lies in Tamenglong district. The terrain is hilly, being part of the West Manipur Hills. Tropical Wet Evergreen and Semi-evergreen Forest dominate (Anwaruddin Choudhury, *pers. comm.* 2003). This site is important for forest birds and may be one of the richest bird diversity areas in Manipur.

AVIFAUNA

During bird survey in July 2009 and October 2010 (R.K. Birjit Singh Kh. Brajesh, *pers. comm.* 2014) a number of globally Threatened species were recorded, like Wood Snipe *Gallinago nemoricola*, and Near Threatened Himalayan Griffon *Gyps himalayensis*, Red-breasted Parakeet *Psittacula alexandri*, Grey-headed Parakeet *P. finschii*, Great Pied Hornbill *Buceros bicornis*, Brown Hornbill *Anorrhinus tickelli*, and River Lapwing *Vanellus duvaucelii*. More than 70 species of birds were sighted in this area.

Some noteworthy records include Dark-necked Tailorbird *Orthotomus atrogularis*, Green-billed Malkoha *Phaenicophaeus tristis*, Dollarbird *Eurystomus orientalis*, Green Imperial-pigeon *Ducula aenae*, Mountain Imperial-pigeon *Ducula badia*, Ashy-headed Green-pigeon *Treron phayrei*, Orange-breasted Green-pigeon *Treron bicinctus*, Yellow-footed Green-pigeon *Treron phoenicopterus phoenicopterus*, Oriental Pied Hornbill *Anthracoceros albirostris*, Blue-throated Barbet *Megalaima asiatica*, Great Barbet *Megalaima virens*, Asian Black Bulbul *Hypsipetes leucocephalus*, Black-crested Bulbul *Pycnonotus melanicterus*, White-throated Bulbul *Alophoixus flaveolus*, Blue-bearded Bee-eater *Nyctyornis athertoni*, Rufous-necked Laughingthrush *Garrulax ruficollis*, Lesser Necklaced

R.K. BIRJIT SINGH

Jiri-Makru is one of the richest bird diversity areas in Manipur. Till 1960s the Green Peafowl *Pavo muticus* was reported from this site

VULNERABLE	
Wood Snipe	*Gallinago nemoricola*
NEAR THREATENED	
Himalayan Griffon	*Gyps himalayensis*
Grey-headed Parakeet	*Psittacula finschii*
Red-breasted Parakeet	*Psittacula alexandri*
Blossom-headed Parakeet	*Psittacula roseata*
Great Hornbill	*Buceros bicornis*
ENDEMIC BIRD AREA 130: EASTERN HIMALAYA	
Grey Sibia	*Heterophasia gracilis*
BIOME 09 INDOCHINESE TROPICAL MOIST FOREST	
Greater Necklaced Laughingthrush	*Garrulax pectoralis*
Rufous-necked Laughingthrush	*Garrulax ruficollis*

Laughingthrush *Garrulax monileger*, Greater Necklaced Laughingthrush *Garrulax pectoralis*, White-browed Scimitar-babbler *Pomatorhinus schisticeps*, Common Hill-myna *Gracula religiosa*, White-vented Myna *Acridotheres grandis*, Striated Yuhina *Yuhina castaniceps*, Silver-eared Mesia *Leiothrix argentauris*, Baya Weaver *Ploceus philippinus* (R.K. Birjit Singh & Kh. Brajesh, *pers. comm.* 2014).

The Green Peafowl *Pavo muticus* was found in the area till 1960s; stray birds might still occur. BirdLife International (2001) considers it as globally Threatened. Other threatened birds found in the area are Rufous-necked Hornbill *Aceros nipalensis* and Great Slaty Woodpecker *Mulleripicus pulverulentus*. The White-winged Duck *Asarcornis scutulata* has been reported but not confirmed.

OTHER KEY FAUNA

The area was an important habitat of the Gaur *Bos gaurus* (Choudhury 2002). Seven species of primates are present, including Capped Langur *Trachypithecus pileata*, Stump-tailed Macaque *Macaca arctoides*, and Western Hoolock Gibbon *Hoolock hoolock*. Carnivores include the Wild Dog *Cuon alpinus*, Asiatic Black Bear *Ursus thibetanus*, Malayan Sun Bear *Helarctos malayanus*, Leopard *Panthera pardus*, and Clouded Leopard *Neofelis nebulosa*. Wild Boar *Sus scrofa*, Sambar *Rusa unicolor*, Barking Deer *Muntiacus muntjak*, and Red Serow *Capricornis rubidus* are the main ungulates found in the area (Choudhury 2013). The estimated population of Hoolock Gibbon here is 50–100 individuals. The Hoolock has been recorded at altitudes of less than 100 m (Choudhury 2006).

LAND USE

- Forestry
- Agriculture

THREATS AND CONSERVATION ISSUES

- Felling of trees
- *Jhum* cultivation
- Poaching of birds

Although Jiri-Makru was notified as a wildlife sanctuary, enforcement is still inadequate. Felling of trees, *jhum* cultivation, and poaching of birds are the main issues.

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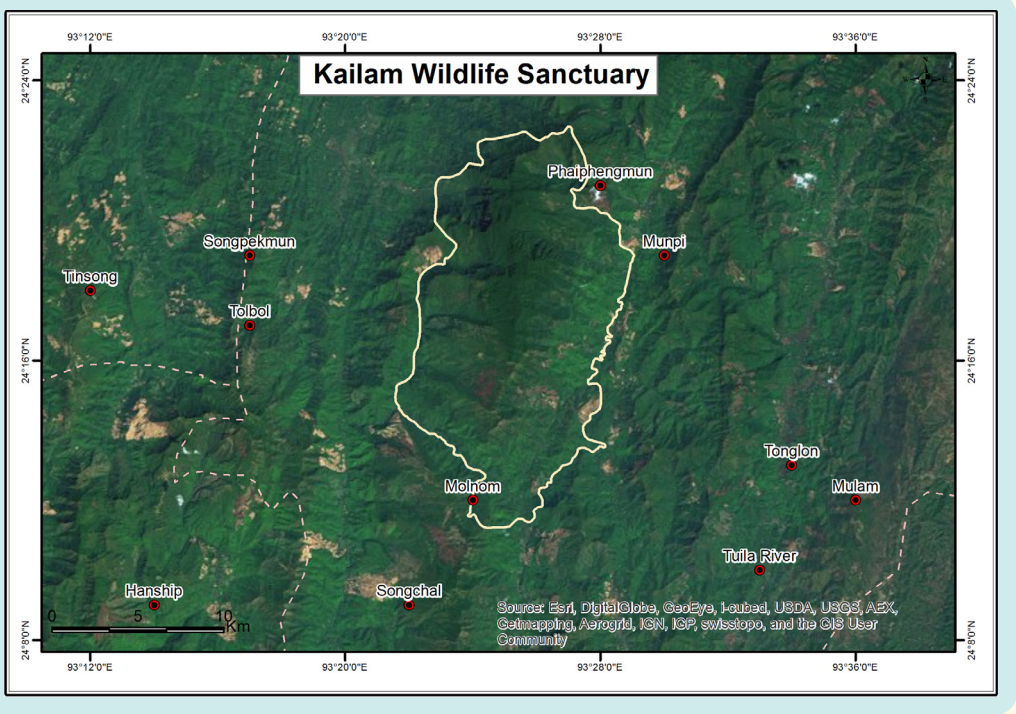
KAILAM WILDLIFE SANCTUARY

IBA Site Code	:	IN-MN-05	**Altitude**	:	500–2,018 msl
State	:	Manipur	**Rainfall**	:	>2,200 mm
District	:	Churachandpur	**Temperature**	:	2 °C to 30 °C
Coordinates	:	24° 11' 60" N, 93° 25' 00" E	**Biogeographic Zone**	:	Northeast
Ownership	:	State	**Habitats**	:	Tropical Evergreen Forest, Sub-tropical Broadleaf Forest
Area	:	18.750 ha			

IBA CRITERIA: A1 (Threatened species), A2 (Endemic Bird Area 130: Eastern Himalaya)

PROTECTION STATUS: Wildlife Sanctuary, established 1991.



GENERAL DESCRIPTION

Kailam Wildlife Sanctuary is located within the Kailam-Tipaimukh Hill Range in Churachandpur district. The terrain is mainly hilly, with a large number of streams and thick forested hillsides. Most of the streams flow from this hill range into the Tuivai river. This is alesser known area of Manipur state. This proposed Data Deficient IBA is covered with Tropical Evergreen and Semi-evergreen Forests and Bamboo Brakes with Subtropical Broadleaf Forest on the hilltops above 1,800 msl. It is an outstanding wilderness area with sizeable primary forest that has somehow survived human onslaught. One reason why Kailam was able to retain its pristine glory is its relative remoteness (Anwaruddin Choudhury, pers. comm. 2014).

The proposed hydroelectric Tipaimukh Dam at the confluence of Barak and Tuivai rivers, which could have submerged the key areas of the sanctuary, has been rejected by the MoEF under pressure from environmentalists and activists, and due to a negative Environment Impact Assessment report (R.K. Birjit Singh, pers. comm. 2015).

AVIFAUNA

General information on avifauna is lacking, due to which this IBA is considered as Data Deficient. According to Anwaruddin Choudhury (pers. comm. 2003, 2014), the birdlife is extremely rich, like most of the tropical rainforests of Manipur. The Rufous-necked Hornbill *Aceros nipalensis*, a Vulnerable species, and Grey Sibia *Heterophasia gracilis* (restricted-range species according to BirdLife International 2001) have been recorded.

There are records of Mrs. Hume's Pheasant *Syrmaticus humiae* from nearby areas (Choudhury 2002), and of its

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This IBA is covered with Tropical Evergreen and Semi-evergreen Forests. The Vulnerable Rufous-necked Hornbill *Aceros nipalensis*, is reported from here

killing from marginal areas of the site.

This site is famous for five species of hornbills: Austen's Brown *Anorrhinus austeni*, Rufous-necked *Aceros nipalensis*, Great Pied *Buceros bicornis*, Wreathed *Aceros undulatus*, and Oriental Pied *Anthracoceros albirostris*. There are few IBA sites that can boast of such a rich diversity of hornbills. In view of the relative inaccessibility and excellent habitat of the IBA, all these hornbills are likely to be present in good numbers. The Vulnerable Blyth's Tragopan Tragopan blythii might occur in the highest areas of this IBA as there is sizeable potential habitat (Anwaruddin Choudhury, pers. comm. 2014).

Kailam Wildlife Sanctuary is located in the Eastern Himalaya Endemic Bird Area (EBA 130) (Stattersfield et al. 1998). There are 21 restricted-range species in this EBA (BirdLife International, undated). Considering the extent of natural forests present in this IBA, most of the restricted-range species of the Eastern Himalaya EBA are likely to occur here.

The greater part of the sanctuary is at 1,000 msl, so it lies in Biome 9 (Indo-Chinese Tropical Moist Forest). In the higher reaches, between 1,000 m and 2,000 m, Biome 8 (Sino-Himalayan Subtropical Forest) is seen. At least 114 biome-restricted species are likely to occur here. A detailed investigation of this IBA is urgently needed.

VULNERABLE	
Rufous-necked Hornbill	*Aceros nipalensis*
NEAR THREATENED	
Mrs. Hume's Pheasant	*Syrmaticus humiae*
Great Pied Hornbill	*Buceros bicornis*
Austen's Brown Hornbill	*Anorrhinus austeni*
Red-breasted Parakeet	*Psittacula alexandri*
ENDEMIC BIRD AREA 130: EASTERN HIMALAYA	
Grey Sibia	*Heterophasia gracilis*

OTHER KEY FAUNA

Detailed surveys in the area are required for a full inventory of mammalian and reptilian fauna. However, from reports and hunters' records, it is evident that the area has rich mammalian diversity. A few Tiger *Panthera tigris* might still be present. Leopard *Panthera pardus*, Clouded Leopard *Neofelis nebulosa*, Golden Cat *Catopuma temminckii*, Malayan Sun Bear *Helarctos malayanus*, Asiatic Black Bear *Ursus thibetanus*, and Dhole or Wild Dog *Cuon alpinus* are still found. Among non-human primates, there are the Slow Loris *Nycticebus bengalensis*, Hoolock Gibbon *Hoolock hoolock*, Stump-tailed Macaque *Macaca arctoides*, Assamese Macaque *M. assamensis*, and Capped Langur *Trachypithecus pileatus*. The Rhesus Macaque *Macaca mulatta* and Pig-tailed Macaque *M. nemestrina leonina*

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Mrs Hume's Pheasant *Syrmaticus humiae*, is under tremendous pressure of hunting and trapping

might also be present. Wild Boar *Sus scrofa*, Sambar *Rusa unicolor*, Indian Muntjac or Barking Deer *Muntiacus muntjak*, Chinese or Long-tailed Goral *Naemorhedus griseus*, and Red Serow *Capricornis rubidus* are the major ungulates found in the area (Choudhury 2013). Antlers, tusks, and horns of these species are frequently found in the fringe as well as in some distant villages.

LAND USE

- Forest
- Jhum cultivation

THREATS AND CONSERVATION ISSUES

- Construction of dam
- Jhum cultivation
- Hunting

Construction of the proposed Tipaimukh hydroelectric dam is a threat that was effectively nullified by advocacy and conservation action. There is some jhum cultivation around the sanctuary. Hunting is common in this as in other areas dominated by indigenous tribes. The national highway that connects Aizawl in Mizoram and Imphal in Manipur passes through this sanctuary. However, very few vehicles ply owing to bad road condition, occasional insurgency by underground elements, and the absence of a bridge on the Tipai river (Anwaruddin Choudhury, pers. comm. 2014).

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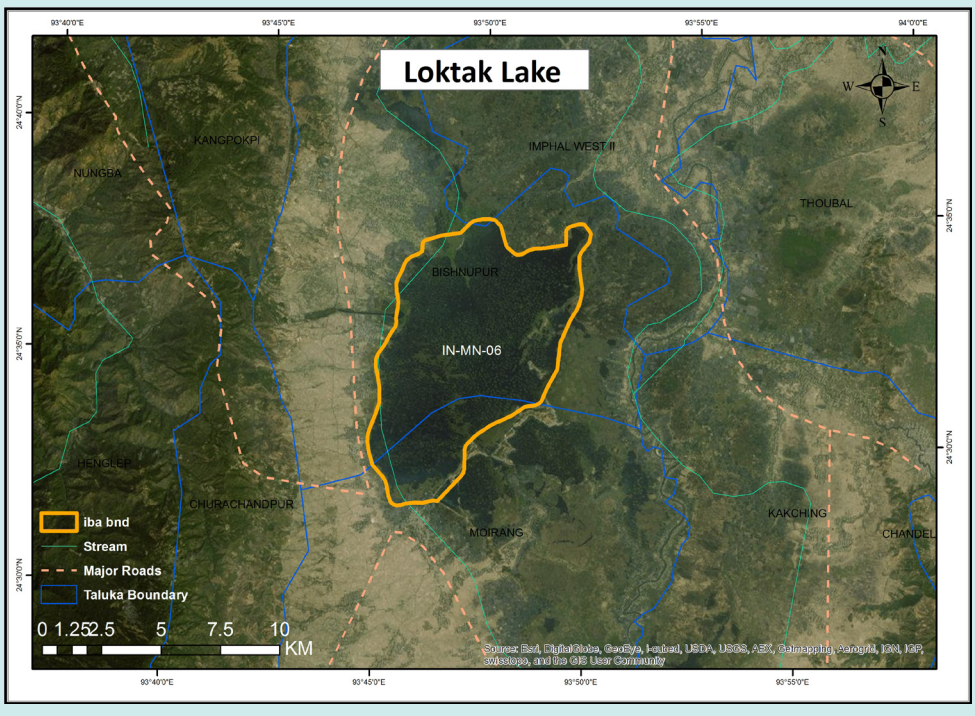
LOKTAK LAKE

IBA Site code	:	IN-MN-06	**Altitude**	:	767–813 msl
State	:	Manipur	**Rainfall**	:	1,400 mm
District	:	Bishnupur, Imphal West	**Temperature**	:	0 ºC to 36 ºC
Coordinates	:	24º 34' 60" N, 93º 49' 60" E	**Biogeographic Zone**	:	Northeast
Ownership	:	State	**Habitats**	:	Freshwater Swamp, Lake, Tall Grassland
Area	:	20,000 ha???			

IBA CRITERIA: A1 (Threatened species), A4iii (≥20, 000 waterbirds)

PROTECTION STATUS: National Park, established March, 1977.



GENERAL DESCRIPTION

Loktak Lake is the largest natural freshwater lake in northeast India and plays an important role in the ecological and economic security of the region. This oval lake with a maximum length of 26 km and width of 13 km has an average depth of 2.7 m. There are 14 hills varying in size and elevation, appearing as islands in the southern part of the lake. Prominent among them are Sendra, Ithing, and Thanga Islands.

The Loktak and other lakes in Manipur valley dominate its economy to a great extent: about three-fourth of the total population of the state lives around these lakes (Choudhury 2002).

The Keibul-Lamjao National Park IBA is just south of this IBA and is home to the Endangered Manipur Brow-antlered Deer *Cervus eldi eldi,* one of the three subspecies of Thamin Deer *Cervus eldi*. The park was created to protect this deer, locally known as Sangai.

The Loktak Lake basin has a direct catchment area of 98,000 ha and an indirect catchment of 715,700 ha. Of the direct catchment area, 43,000 ha is under paddy cultivation, 15,000 ha under human habitation, and 40,000 ha bears forests.

The lake was designated as a Wetland of International Importance under the Ramsar Convention in 1990 (Tombi & Singh 1994, Islam & Rahmani 2008).

Loktak Lake has a large continuous mass of swamp with floating mats of vegetation, locally known as *phumdi*s. *Phumdi*s are composed of decaying vegetation, up to 1.6 m thick and 80% submerged, and can support the weight of large mammals. The vegetation includes *Zizania latifolia*, *Leersia hexandra*, *Phragmites karka*, *Cepithipedium* spp., *Carex* spp., *Saccharum munja*, *Coix lacryma-jobi*, *Narenga porphyrocoma*, and *Polygonum perfoliatum*. Within Indian

limits, *Zizania latifolia* is found only in Loktak Lake (Choudhury 2002). There are small hillocks within the lake, namely Sendra and Thanga, which are inhabited by humans but provide refuge to smaller mammals and reptiles.

AVIFAUNA

Loktak Lake provides refuge to thousands of birds of at least 116 species, including 21 species of waterfowl. Their numbers would easily exceed 20,000 (A4iii criteria: site known or thought to hold, on a regular basis, equal to or more than 20,000 waterbirds or >10,000 pairs of seabirds of one or more species). There are records of Critically Endangered Baer's Pochard *Aythya baeri*, Vulnerable Pallas's Fish-eagle *Haliaeetus leucoryphus*, Near Threatened Black-headed Ibis *Threskiornis melanocephalus*, Falcated Duck *Anas falcata*, Ferruginous Duck *Aythya nyroca*, Black-tailed Godwit *Limosa limosa*, and Eurasian Curlew *Numenius arquata* (Choudhury 2009). It also has records of the Vulnerable Greater Spotted-eagle *Clanga clanga* and Near Threatened Spot-billed Pelican *Pelecanus philippensis*. The Lesser Adjutant *Leptoptilos javanicus* is also reported. So the site also qualifies for A1 criteria.

During a waterbird count carried out on January 18, 2014, a total population 32,855 waterbirds of 58 species were recorded (Singh & Singh 2014). The report also mentions waterbird counts of the previous years as 13,654 birds in 2011, 26,220 birds in 2012, and 34,356 birds in 2013. During the 2014 count, interesting species like Mandarin Duck *Aix galericulata* (two birds), Oriental Darter *Anhinga melanogaster* (seven birds), Ferruginous Duck *Aytha nyroca* (108 birds), Common Crane *Grus grus* (two birds), Grey-headed Lapwing *Vanellus cinereus* (42 birds), Common Shelduck *Tadorna tadorna* (two birds), Great Crested Grebe *Podiceps cristatus* (16 birds), Greylag Goose *Anser anser* (nine birds), Kentish Plover *Charadrius alexandrinus* (32 birds), Northern Lapwing *Vanellus vanellus* (six birds), and Comb Duck *Sarkidiornis melanotos* (two birds) were sighted. The most abundant waterbird was the Lesser Whistling Duck *Dendrocygna javanica*, with a count of 14,993 birds.

During an IBCN survey in Loktak Lake during December 9–10, 2013 a male Mandarin Duck *Aix galericulata* was

CRITICALLY ENDANGERED	
Baer's Pochard	*Aythya baeri*
VULNERABLE	
Lesser Adjutant (?)	*Leptoptilos javanicus*
Sarus Crane	*Grus antigone*
Pallas's Fish-eagle	*Haliaeetus leucoryphus*
Greater Spotted-eagle	*Clanga clanga*
NEAR THREATENED	
Spot-billed Pelican	*Pelecanus philippensis*
Oriental Darter	*Anhinga melanogaster*
Black-headed Ibis	*Threskiornis melanocephalus*
Falcated Duck	*Anas falcata*
Ferruginous Duck	*Aythya nyroca*
Black-tailed Godwit	*Limosa limosa*
Eurasian Curlew	*Numenius arquata*

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Loktak Lake is the largest natural freshwater lake in northeast India. Besides its ecological and economical role in the region, it is famous for Manipur Brow-antlered Deer, locally called Sangai

seen near Toubul village (Kasambe & Singh 2014). There are only a few records of this species from north-east India. Himalayan Rubythroat *Luscinia pectoralis* (four birds), Osprey *Pandion haliaetus* (one bird), and Rufescent Prinia *Prinia rufescens* (one bird) were seen at two places during the survey.

There are many old reports of Eastern Sarus Crane *Grus antigone sharpii*. Higgins (1934) mentions that the species is "not uncommon, residing and breeding in the swamps in the south of the valley: but it is not shot". The birds were mainly found in pairs, and once a large flock of 20 to 30 individuals was seen. The Hooded Crane *Grus monachus* was also found in Manipur, nearly 100 years ago, but none have been seen in recent decades.

OTHER KEY FAUNA

Altogether 425 species of animals (249 vertebrates and 176 invertebrates) have been identified in the lake, which is used as a breeding ground for several fish species. The total faunal diversity is likely to be higher, as many species have not been properly identified or surveyed. In the past the famous Manipur Brow-antlered Deer or Sangai, and Hog Deer *Axis porcinus* used to occur in the southern areas of present IBA but they are now confined further south in Keibul Lamjao IBA. Other fauna of the site includes the Large Indian Civet *Viverra zibetha*, Small Indian Civet *Viverricula indica*, and Common Otter *Lutra lutra*. Wild Boar *Sus scrofa* is occasionally met with along the southern margin bordering Keibul Lamjao IBA.

Ningombam & Bordoloi (2007) reported the occurrence of 25 species of amphibians belonging to seven families in the Loktak Lake area.

Singh & Varatharajan (2014) reported the occurrence of 119 species of thrips belonging to 74 genera and three families of order Thysanoptera (Insecta). Of these, 48 species are endemic to India. *Mycterothrips auratus*, earlier known from China and Taiwan, has been collected for the first time from India.

LAND USE

- Fisheries
- Tourism and recreation
- Water management
- Transport
- Human habitation

THREATS AND CONSERVATION ISSUES

- Overfishing
- Filling in of wetlands
- Siltation and reclamation
- Pollution

The lake ecosystem has changed considerably after the construction of a multipurpose hydroelectric and irrigation project. The natural wetland with fluctuating water level was converted into a reservoir with a more or less constant water level. Besides bringing about basic hydrological changes, this resulted in severe problems for the lake biota and the communities traditionally dependent on it. Loktak has, therefore, been placed in the Montreaux record, a list of internationally important wetlands (Ramsar Sites), that have undergone or are undergoing significant changes in their ecological character. Currently, Loktak is threatened by excessive loading of silt and nutrients from various anthropogenic sources. Deforestation, shifting cultivation, uncontrolled use of fertilizers in agricultural lands, and discharge of domestic waste, all contribute to the input of silt and nutrients into the lake. This will accelerate the ageing of the lake by rapid siltation and excessive biomass production.

Recently, the Loktak Development Authority has started removal of *phumdi*s from Loktak Lake and some are being dumped in the northern part of Keibul Lamjao. While it is opening up more areas of the lake, the filling in of Keibul Lamjao may have its own ecological consequences that need to be looked into. Loktak Lake has lost its unique feature, i.e., the floating huts on *phumdi*s. The few remaining huts are also on the wane. The fisherfolk have now settled on the mainland. The removal of *phumdi*s has increased the area of open water in Loktak which is convenient for many species of ducks, but removal on a larger scale and its impact needs critical assessment (Anwaruddin Choudhury, *pers. comm*. 2014).

The construction of Moirang-Sendra and Keibul Thanga causeways have completely separated Takmu sub-basin from the main Loktak Lake. The Bishenpur-Mayang Imphal road has also been constructed across the northern part of the lake. Increasing numbers of causeways obstruct water flow and encourage human settlement. Numerous fish farms and floating hutments have proliferated in the lake. The domestic sewage from the floating hutments, which is directly discharged into the lake, is accelerating the process of eutrophication. The use of DDT to fight the mosquito menace has further added to chemical pollution. There are 55 rural and urban settlements around the lake. The total human population in and around the lake is estimated to be about 100,000, of which about 30,000 are fishermen. Two major land uses in the catchment are shifting cultivation in the forests on the hills and paddy cultivation in the valley.

Populations of both migratory and resident waterfowl, several macrophytes, and fish have rapidly declined in the past few decades. Shooting, netting, pesticide pollution and hydrological changes, as well as increased human presence, fishing, removal of vegetation, and tourism have all contributed to the decline in bird numbers. There is an increasing tendency among people to kill the birds for consumption and sale. Earlier, birds were trapped but

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Despite intensive use, Loktak Lake still attracts thousands of waterbirds. Loktak Lake is a Ramsar Site

in recent years, villagers have taken to killing birds by poisoning them with insecticides and pesticides placed in small fish bait.

Recent reports have highlighted the major threats that are affecting this fragile lake ecosystem, the most important among them being the rapidly spreading *phumdi*s and aquatic weeds, which threaten to cover almost 70% of the lake. The considerable increase in *athaphum* (making of artificial floating mats) and fishing has led to increase of *phumdi* area. Now, it covers about 134.6 sq. km (47 per cent of the surface area of the lake). The overall area of *phumdi*s in the lake has increased from 116.4 sq. km to 134.6 sq. km during 1989–2002 (Singh & Morangleima 2009). This has led to a decline in the number of rooted floating plant species such as *Nelumbo nucifera*, *Trapa natans*, *Euryale ferox*, *Nymphaea* sp., and *Nymphoides indica* (to name a few), which were abundant in the area. This habitat, which served as home to important birds such as *Hydrophasianus chirurgus* and *Metopidius indicus* is now devoid of them. More than 16 indigenous species of fish and 20 economically important species of aquatic plants are reported to have disappeared (Singh *et al*. 2013).

According to a recent survey, the lake is under severe stress mainly due to human interventions like the construction of Ithai Barrage Dam, weed infestation, pollution, encroachment, over-exploitation of resources, and siltation, which cause flooding of agricultural fields and villages, decrease in fisheries production, and loss of biodiversity. The resultant impacts on the livelihood of the lake dwellers showed change in their occupational structure and income, increase in unemployment and health problems (Singh & Moirangleima 2012).

The Manipur Government runs the Loktak Development Authority (LDA) whose mission is "Restore and develop Loktak Lake resources and biodiversity for present and future generations through participatory processes, research and conservation activities." The LDA has identified the following key issues:

1. Enhanced soil erosion leading to wetland sedimentation due to shifting cultivation and loss of vegetal cover in the catchment area. Reduction in water holding capacity of wetlands as a consequence of siltation, encroachments, and prolific growth of aquatic vegetation.
2. Flooding in peripheral areas leading to inundation of agricultural areas and damage to life and property.
3. Deterioration of water quality due to inflow of sewage from urbanized and peripheral areas.
4. Decline in fish resources thereby affecting the livelihoods of the fisher communities.
5. Degradation of *phumdi*s in KLNP affecting the biodiversity of the national park particularly flagship species, *Cervus eldi eldi*.
6. Poverty due to resource degradation and limited opportunities of livelihood diversification (Anon. 2011).

The LDA carried out various activities for the development of Loktak Lake, which included waterbird migration studies in collaboration with BNHS, Wildlife Wing of Forest Department, and local organizations. Assessments were conducted for species distribution, composition, feeding and foraging habits in relation to the lake environment. The bird census programme was conducted by laying transect lines, point counts at strategic locations and "mistnetting"

DHRITIMAN MUKHERJEE

Floating vegetation or *phumdis* is characteristic feature of the Loktak Lake. Some phumdis are so large and thick that houses are built on them

methods. Capacity building programme on "Monitoring of Water Birds and Wildlife Management" and "Media Sensitisation" were organised for Keibul Lamjao National Park (KLNP) managers. KLNP management infrastructure was enhanced by providing them with vehicles, motorbikes, dugout canoes, computers, and WTI outfits (Anon. 2011).

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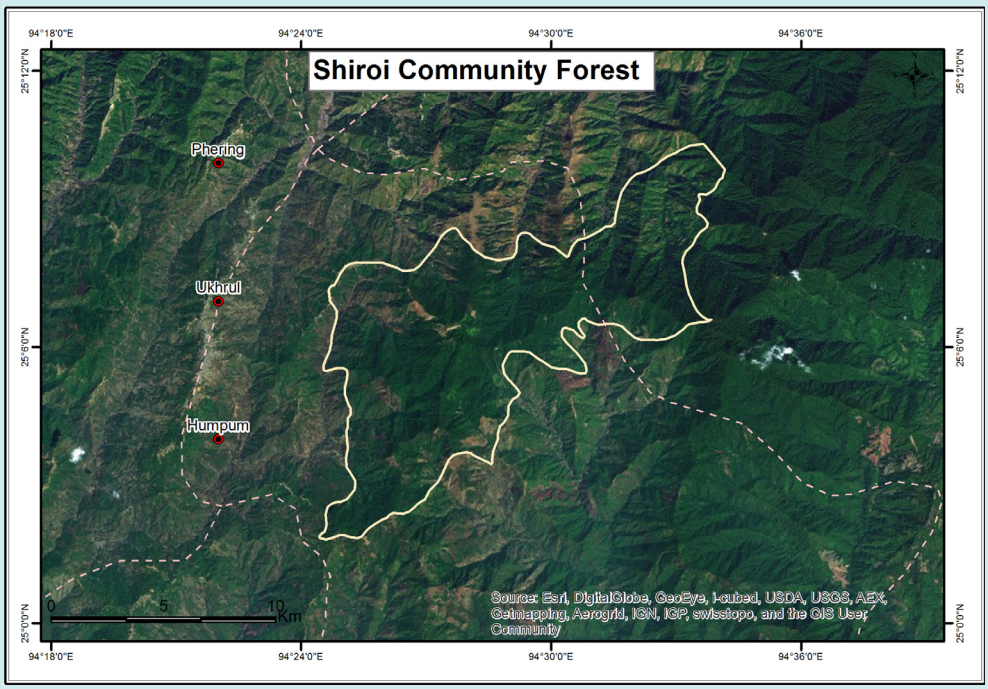
SHIROI (SHIRUI) COMMUNITY FOREST

IBA Site code	:	IN-MN-07	**Altitude**	:	1,500–2,570 msl
State	:	Manipur	**Rainfall**	:	>2,000 mm
District	:	Ukhrul	**Temperature**	:	-4 °C to 26 °C
Coordinates	:	25° 06' 00" N, 94° 27' 32" E	**Biogeographic Zone**	:	Northeast
Ownership	:	Community	**Habitats**	:	Sub-tropical Broadleaf Hill Forest, Montane Grassy Slopes
Area	:	5,000 ha			

IBA CRITERIA: A1 (Threatened species), A2 (Endemic Bird Area 130: Eastern Himalaya)

PROTECTION STATUS: Not officially protected. Proposed National Park.



GENERAL DESCRIPTION

Shiroi or Shirui Hills are located in the Ukhrul district of Manipur state, *c.*100 km northeast of the capital, Imphal. Though most of the hills are denuded of forest cover due to *jhum* cultivation, the slopes of Shiroi Hills still have good Subtropical Broadleaf Forest with grasses and shrubs on the hilltop. Shiroi Hills are famous for pitchers plants yet to be identified, and for the beautiful Shirui Lily *Lilium macklineae* which is endemic to Shirui Ridge.

The area supports Threatened species such as the Grey-sided Thrush *Turdus feae*, locally known as *Siri*. The species is migratory, breeding in the mountains of north-east China, and migrating to Shiroi and other parts of Ukhrul and Senapati districts of Manipur.

Mrs. Hume's Pheasant *Syrmaticus humiae*, Rufous-necked Hornbill *Aceros nipalensis*, and Blyth's Tragopan *Tragopan blythii* are the key species here. Considering the ecological importance of the area, the State Government of Manipur proposes to declare the Shiroi Hills (*c.* 4,100 ha) as a national park, but due to a boundary dispute between the villages of Shiroi and Shihai Khullen, the area could not be declared till now (R.K. Birjit Singh, *pers. comm*. 2014).

AVIFAUNA

There is little information on the avifauna of the Shiroi Hills area, except for the known presence of a few Threatened birds. Choudhury (2002) recorded Mrs. Hume's Pheasant *S. humiae humiae* at this site. This globally Threatened species is still found in the hills of Ukhrul and Senapati districts of Manipur. It is also thinly distributed in the hill tracts of Arunachal Pradesh, Nagaland, and Mizoram, northern and western Myanmar, and southwestern China (Ali & Ripley 1987).

Hume's Pheasant has two subspecies, one of which, the nominate *S. humiae humiae*, is found in India in Shiroi and in western Myanmar, while the other, *S. h. burmanicus*,

occurs in southern China, northern and eastern Myanmar, and extreme northern Thailand (BirdLife International 2001). The global population is estimated at a few thousand individuals, and the population of subspecies *humiae* may be as low as 1,000 (BirdLife International 2001). As the species survives in disturbed and secondary forests, deforestation may not be its main threat. However, this large bird is extensively hunted for its flesh.

Shiroi is an important habitat for two species of hornbills, the Vulnerable Rufous-necked *Aceros nipalensis* and the Near Threatened Austen's Brown Hornbill *Anorrhinus austeni*.

Shiroi Hills IBA is included in the Eastern Himalaya Endemic Bird Area (EBA 130), identified by Stattersfield *et al*. (1998). This bird-rich area of India has 21 restricted-range species, of which two have been definitely identified in Shiroi but more are likely to occur. The site lies in Biome 7 (Sino-Himalayan Temperate Forest), in which 112 species are listed by BirdLife International (undated). As the habitat is largely intact, many species of this biome are likely to occur here. Detailed investigation on the avifauna is urgently needed.

During an IBCN survey, on December 15, 2013, Himalayan Bulbul *Pycnonotus leucogenys*, Striated Bulbul *P. striatus*, Flavescent Bulbul *P. flavescens*, Black Bulbul *Hypsipetes leucocephalus*, Mountain Bulbul *Ixos mcclellandii*, Maroon Oriole *Oriolus traillii*, Crested Finchbill *Spizixos canifrons*, and Black Stork *Ciconia nigra* were seen in the reserve.

VULNERABLE	
Blyth's Tragopan	*Tragopan blythii*
Rufous-necked Hornbill	*Aceros nipalensis*
Grey-sided thrush	*Turdus feae*
NEAR THREATENED	
Mrs. Hume's Pheasant	*Syrmaticus humiae*
ENDEMIC BIRD AREA 130: EASTERN HIMALAYA	
Blyth's Tragopan	*Tragopan blythii*
Grey Sibia	*Malacias gracilis*
BIOME 08: SINO-HIMALAYAN SUBTROPICAL FOREST	
Himalayan Bulbul	*Pycnonotus leucogenys*
Black Bulbul	*Hypsipetes leucocephalus*
Striated Bulbul	*Pycnonotus striatus*
Flavescent Bulbul	*Pycnonotus flavescens*
Mountain Bulbul	*Ixos mcclellandii*
Maroon Oriole	*Oriolus traillii*
Crested Finchbill	*Spizixos canifrons*

OTHER KEY FAUNA

As in the other hill forests of Manipur, Hoolock Gibbon *Hoolock hoolock*, Stump-tailed Macaque *Macaca arctoides*, and Slow Loris *Nycticebus bengalensis* are found. Asiatic Black Bear *Ursus thibetanus*, Malayan Sun Bear *Helarctos malayanus*, Clouded Leopard *Neofelis nebulsa*, Leopard *Panthera pardus*, and Dhole or Wild Dog *Cuon alpinus* are among the known mammals. Tiger *Panthera tigris* and Gaur *Bos gaurus* were occasionally met with, but their current status is not known. Among the reptiles, Burmese

R.K. BIRJIT SINGH

R.K. BIRJIT SINGH

Shiroi Lily *Lilium macklineae* is endemic to Shiroi Ridge

R.K. BIRJIT SINGH

Shiroi Hill still has good Subtrapical Broadleaf Forest with grasses and shrubs on the hilltop

Rock Python *Python molurus bivittatus* and King Cobra *Ophiophagus hannah* occur. Not much information is available on the other reptiles and amphibians (Anwaruddin Choudhury, *pers. comm*. 2014).

LAND USE

- Forestry
- Agriculture
- Catchment area

THREATS AND CONSERVATION ISSUES

- Hunting and trapping
- Collection of plants
- Cultivation
- Tree felling

This hill is the only known home of the Shirui Lily, and the local people have a deep cultural and emotional attachment to this flower. Uncontrolled tourism and indiscriminate collection of the Shirui Lily has led to its severe decline (Salam Rajesh, *pers. comm*. 2003). Protecting this flower and the hill will also protect the threatened birds found in and around the hill. Tree felling and trapping of galliforms are major threats to the habitat and species.

Eye-browed Thrush *Turdus obscurus* is killed in large numbers by the villagers during winter, with glued sticks (Choudhury 1998). During an IBCN survey in December 2013, hunting was seen as a major threat to the birds of this area, many men of all ages were seen engaged in hunting wildlife using various hunting techniques. The people consider hunting as a tradition and do not know or recognize the laws against hunting (Raju Kasambe, *pers. comm*.).

The local people could be motivated by making them aware of the need to protect this unique hill range. Since the area is not a sanctuary or a national park, conservation efforts should be initiated by non-governmental organizations with the community leaders.

The streams originating from Shiroi Hill are the only source of water for Ukhrul town, the district headquarters, therefore this IBA is very important for the water security of the people.

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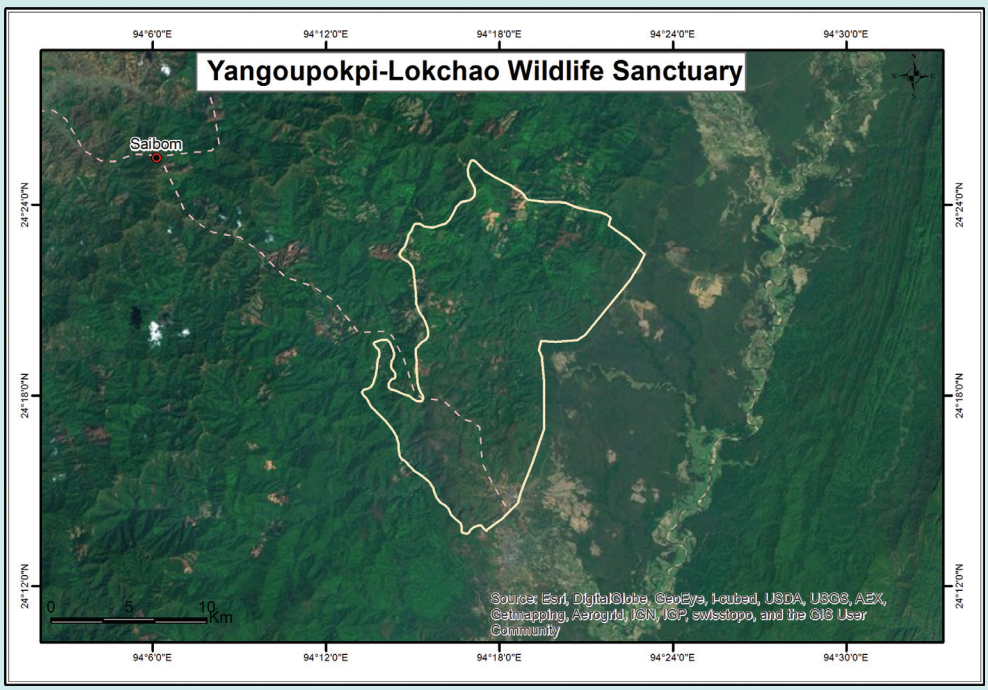
YANGOUPOKPI-LOKCHAO WILDLIFE SANCTUARY

IBA Site code	:	IN-MN-08	**Altitude**	:	276m–888 msl
State	:	Manipur	**Rainfall**	:	>1,500 mm
District	:	Chandel	**Temperature**	:	6 °C to 32 °C
Coordinates	:	24° 20' 10" N, 93° 46' 50" E	**Biogeographic Zone**	:	Northeast
Ownership	:	State	**Habitats**	:	Tropical Semi-evergreen Forest, Tropical Moist Deciduous Forest
Area	:	18,480 ha			

IBA CRITERIA: A1 (Threatened species), A2 (East Himalayan Endemic Bird Area)

PROTECTION STATUS: Wildlife Sanctuary, established March, 1989.



GENERAL DESCRIPTION

Yangoupokpi-Lokchao Sanctuary in located on the Indo-Myanmar border, *c.* 110 km from Imphal. The eastern boundary of the sanctuary is contiguous to the international border. Moreh town, a point of international trade, is located on the fringe of this sanctuary. Some studies have been done on the flora and fauna, but more work is required for a full inventory. The Green Peafowl *Pavo muticus* has been reported from the sanctuary, which is an important international refuge for wildlife from either side of the international border and may house some Southeast Asian components also. Tropical Moist Deciduous Forests cover the area, while the valleys bear Tropical Semi-evergreen forests.

AVIFAUNA

No detailed information is available for this data deficient site, which is one of the two areas in India where the Green Peafowl is still occasionally seen (Choudhury 2000), which BirdLife International (2001) had listed as Vulnerable, but recently it has been upgraded to Endangered (BirdLife International 2014), as it has a rapidly declining and severely fragmented population, owing primarily to high hunting pressure and habitat destruction. Rapid decline and further fragmentation are foreseen, hence its Endangered status.

This site falls in the East Himalaya Endemic Bird Area (EBA (Stattersfield *et al.* 1998). This part of the Himalaya is particularly rich in restricted-range (endemic) birds, and the genus *Sphenocichla* is endemic to this EBA. BirdLife International (undated) has identified 21 Indian bird species restricted to this EBA. We do not know how many of these species are found in this site.

Yangoupokpi-Lokchao Wildlife Sanctuary comes within Biome 9 (Indo-Chinese Tropical Moist Forest). Nineteen bird

R.K. BIRJIT SINGH

Yangoupokpi-Lokcchao Sanctuary located on Indo-Myanmar border, is a part of East Himalaya Endemic Bird Area

species occur in this biome (BirdLife International, undated). As the forest is largely intact, many of these biome-restricted species are likely to occur in this IBA. Detailed investigation of the biodiversity of this site is urgently needed in view of its deteriorating conditions.

Devi (2013) recorded 145 species of birds, belonging to 35 families, in the sanctuary. Some notable species include Green Peafowl *Pavo muticus*, Great Pied Hornbill *Buceros bicornis*, Kaleej Pheasant *Lophura leucomelanos*, Yellow-legged Buttonquail *Turnix tanki*, Himalayan Vulture *Gyps himalayensis*, Wreathed Hornbill *Aceros undulatus*, Greenish Warbler *Phylloscopus trochiloides*, Orange-headed Thrush *Zoothera citrina*, Daurian Redstart *Phoenicurus auroreus*, Red-rumped Swallow *Hirundo daurica*, White-crested Laughingthrush *Garrulax leucolophus*, and Greater Necklaced Laughingthrush *Garrulax pectoralis*.

A bird survey was conducted by IBCN during December 12–13, 2013 from Moreh to Kwatha Khunou village in the sanctuary area. Oriental Pied Hornbill *Anthracoceros albirostris* and Blue-bearded Bee-eater *Nyctyornis athertoni* were seen during the survey (Raju Kasambe, unpubl. data 2013).

VULNERABLE	
Green Peafowl	*Pavo muticus*
NEAR THREATENED	
Himalayan Griffon	*Gyps himalayensis*
White-cheeked Partridge	*Arborophila atrogularis*
Mrs. Hume's Pheasant	*Syrmaticus humiae*
Great Pied Hornbill	*Buceros bicornis*

OTHER KEY FAUNA

Rich primate diversity in this sanctuary includes the Slow Loris *Nycticebus bengalensis*, Assamese Macaque *Macaca assamensis*, Pig-tailed Macaque *M. nemestrina leonina*, Rhesus Macaque *M. mulatta*, Capped Langur *Trachypithecus pileatus*, and Hoolock Gibbon *Hoolock hoolock*. Notable carnivores found are Dhole or Wild Dog *Cuon alpinus*, Asiatic Black Bear *Ursus thibetanus*, Malayan Sun Bear *Helarctos malayanus*, Leopard Cat *Prionailurus bengalensis*, Clouded Leopard *Neofelis nebulosa*, Leopard *Panthera pardus*, and Tiger *P. tigris*, which is perhaps extirpated. Among ungulates, there are the Wild Pig *Sus scrofa*, Sambar *Rucervus unicolor*, Barking Deer *Muntiacus muntjak*, and Red Serow *Capricornis rubidus* (Choudhury 2013). Among turtles and tortoises, Choudhury (2011) recorded Elongated Tortoise *Indotestudo elongata* **and** Indian Black Turtle *Melanochelys trijuga*. Other important reptiles are Indian Leaf Turtle *Cyclemys gemeli*, Asian Brown Tortoise *Manouria emys*, Bengal Monitor *Varanus bengalensis*, Red-necked Keelback *Rhabdophysis subminiatus*, and Burmese Rock Python *Python molurus bivittatus* (R.K. Birjit Singh, *per comm*. 2014)

LAND USE

- Nature reserve
- Agriculture

THREATS AND CONSERVATION ISSUES

- Hunting
- Habitat loss

RAJU KASAMBE

Tropical Moist Deciduous Forests occurs on the hill slopes while Semi-evergreen Forest is found in the valleys. More than 140 species a of birds have been identified in this IBA

- Tree felling
- *Jhum* cultivation
- Charcoal making
- Encroachment

The site is located on the international border, so poaching and smuggling of wildlife products are rampant. Moreh is a fast growing township of Manipur on the international border where international trade is allowed. As a result, human settlers put pressure on the sanctuary. Illegal charcoal production to supply Tamu town in Myanmar is a growing problem.

Devi (2013) has recorded numerous threats to the IBA as follows: The peripheral areas of the sanctuary suffer high degree of human disturbance. Large areas of the forest were being burned down, for timber and largely for making charcoal. Hunting of wildlife is a common practice for communities living inside the sanctuary and in the peripheral areas. Poaching of birds and selling them in the nearby markets is seen. Since the site is near the international border, smuggling of wildlife and forest products is very common and is now becoming a major problem.

During an IBCN survey in December 2013, rampant tree felling was seen both for timber and making charcoal. Mechanised tree felling was being done on a very large scale in the forested areas along the Myanmar border (Raju Kasambe, ***pers. obs.*** 2013). Clear felling is also done on a large scale to enable *jhum* cultivation.

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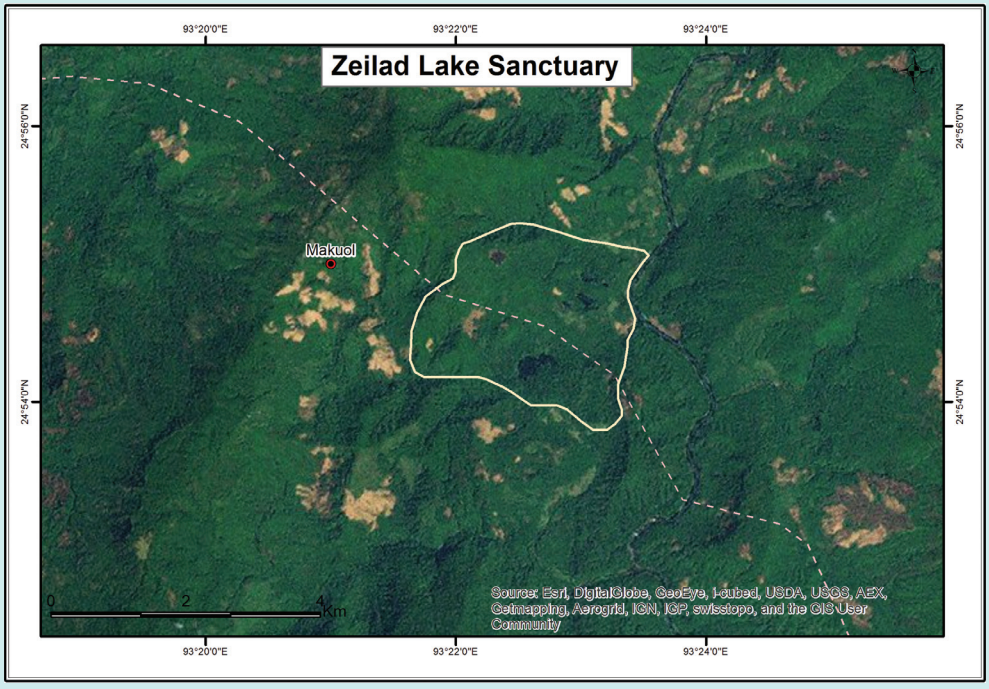
ZEILAD LAKE SANCTUARY

IBA Site code	:	IN-MN-09	**Altitude**	:	200–240 msl
State	:	Manipur	**Rainfall**	:	2,500–3,500 mm
District	:	Tamenglong	**Temperature**	:	6 °C to 30 °C
Coordinates	:	24° 53' 60" N, 93° 22' 60" E	**Biogeographic Zone**	:	Northeast
Ownership	:	State	**Habitats**	:	Tropical Wet Evergreen Forest, Freshwater Lake and Swamp
Area	:	2,100 ha			

IBA CRITERIA: A1 (Threatened species), Data Deficient

PROTECTION STATUS: Wildlife Sanctuary, established 1997.



GENERAL DESCRIPTION

Zeilad Lake Sanctuary is located in the West Manipur Hills and is known for its five lakes surrounded by tropical rainforest. It is located 20 km from the district headquarters, Tamenglong town. The site lies in hilly terrain in the Barak river basin, and there is no motorable access road, one has to walk down from the Tamenglong-Nungba main road (Choudhury 2002).

AVIFAUNA

A waterbird survey conducted during October, 2014 (Birjit 2014) by the Wildlife Wing, Department of Forests, Government of Manipur recorded 14 waterbird species, which include Lesser Whistling-duck *Dendrocygna javanica*, Common Teal *Anas creca*, Tufted Duck *Aythya fuligula*, Common Pochard *Aythya ferina*, and Gadwall *Mareca strepera*. Two individuals of Near Threatened Ferruginous Pochard *Aythya nyroca* were also sighted at Zeilad Lake. The Near Threatened Great Pied Hornbill *Buceros bicornis* and Brown Hornbill *Anorrhinus austeni* are found in the area (Anwaruddin Choudhury, *pers. comm.* 2003). During field work in 2001, the Bamboo Partridge *Bambusicola fytchii* was found to be common in the area. There is an interesting record of Black-capped Kingfisher *Halcyon pileata* in 2001 (Choudhury 2009).

OTHER KEY FAUNA

Among the mammals there are Hoolock Gibbon *Hoolock hoolock*, Pig-tailed Macaque *Macaca nemestrina leonina*, Assamese Macaque *Macaca assamensis*, Stump-tailed Macaque *M. arctoides*, Capped Langur *Trachypithecus pileata*, Slow Loris *Nycticebus bengalensis*, Binturong *Arctictis binturong*, Asiatic Black Bear *Ursus thibetanus*, Malayan Sun Bear *Helarctos malayanus*, Leopard *Panthera pardus*,

R.K. BIRJIT SINGH

Zeilad Lake Sanctuary has five lakes surrounded by tropical rainforest

Barking Deer *Muntiacus muntjak*, and Crestless Himalayan Porcupine *Hystrix brachyura*. A Sumatran Rhinoceros *Dicerorhinus sumatrensis* is recorded to have been shot near this sanctuary in the 1930s (Choudhury 2013). There are reports of Clouded Leopard *Neofelis nebulosa*, Red Serow *Capricornis rubidus*, and Malayan Giant Squirrel *Ratufa bicolor* from the area. An occasional Tiger *Panthera tigris* used to be met with, at least till the last decade, and several species of turtles in the lakes are noteworthy. One of the lakes in the sanctuary is known as Guiphuap (Guiphuap = turtle, in the Zeliangrong Naga dialect) (Anwaruddin Choudhury, *pers. comm*. 2014). In the forests of this IBA, Choudhury (2011) recorded Eastern Hill or Asian Brown Tortoise *Manouria emys* and Keeled Box Turtle *Cuora mouhotii*.

LAND USE

- Forestry
- Agriculture
- Fishing

THREATS AND CONSERVATION ISSUES

- Felling of trees
- *Jhum* cultivation
- Poaching of birds
- Fishing

Although notified as a wildlife sanctuary in 1997, enforcement is still inadequate. Felling of trees, *jhum* cultivation on the hill slopes, and poaching of birds are the main issues.

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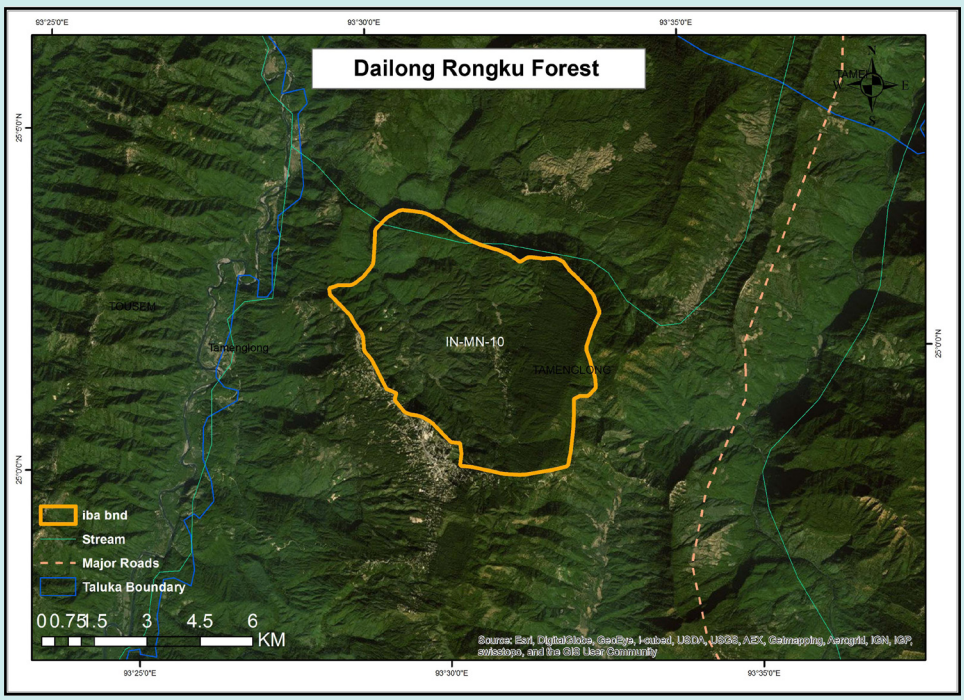
DAILONG RONGKU FOREST

IBA Site Code	:	IN-MN-10	**Ownership**	:	State
State	:	Manipur	**Area**	:	20 sq. km
Administrative Region	:	Tamenglong (Manipur State)	**Altitude**	:	194–2,523 msl
			Rainfall	:	>2,000 mm
District	:	Tamenglong	**Temperature**	:	2 °C to 28 °C
Coordinates	:	E-25° 01.104', E-93° 31.277' N, 93° 17' 29" E	**Biogeographic Zone**	:	Biogeographic Zone Northeast
			Habitats	:	Montane Wet Temperate Forest, Tropical Dry Evergreen Forest

IBA CRITERIA: A1 (Threatened species), A2 (Endemic Bird Area 130: Eastern Himalaya), A4iv migratory species at bottleneck sites

PROTECTION STATUS: Not officially protected.



GENERAL DESCRIPTION

Dailong Rongku Forest is situated in Tamenglong district in Manipur. It is one of the oldest villages in Tamenglong and was earlier known as Poudailong which means 'Stone Village' because of the presence of large stones in the village. The people belong to the Rongmei tribe. The forest area has been divided into 382 plots which are allotted to 382 villagers as proposed by their respective clans. The Rongmei, Zemei, and Liangmei tribes of Dailong and Tamenglong district traditionally conserveforests in the form of sacred groves known as 'Raengan' meaning 'gateway conservation (resting) site of the farmers' which are the precursors to the present conservation activities of these tribes in Tamenglong district. The tribes manage and maintain their own plots under the direction of a local NGO, Dailong Ecology & Environment Preservation Society (DEEPS).

Many streams originate from the catchment areas of the forest and feed the Barak river. Tropical Evergreen and Semi-evergreen Forests occur in the sanctuary. In 1978, DEEPS started a campaign to conserve the forest with specific objectives which include the preservation of biodiversity in the forest. The area earmarked for conservation is up to east of Imphal and Tamenglong road. This ongoing conservation initiative was started especially to ensure perpetual water supply to Tamenglong and Dialong.

A survey conducted in October, 2011 and November, 2014 resulted in sightings of many species of birds and butterflies. The site is very important as a bottleneck for

the migration of Amur Falcon *Falco amurensis*. During the last week of October and first fortnight of November, more than 100,000 falcons pass through the area. They stay here for few days, and roost in bamboo bushes. The tribals used to hunt these falcons, but now hunting has been reduced because of the DEEPS initiative.

AVIFAUNA

The area is very rich in bird diversity. During the survey in October, 2011 and November, 2014, besides Amur Falcon, Common Green Magpie *Cissa chinensis*, Mountain Bamboo partridge *Bambusicola fytchii*, White-browed Piculet *Sasia ochracea*, flocks of White-crested Laughingthrush *Garrulax leucolophus* were seen. Flocks of 10–12 birds of the Near Threatened Blossom-headed Parakeet *Psittacula roseata*, River Tern *Sterna aurantia*, and Grey-headed Parakeet *Psittacula finschii* were seen during an IBCN survey in October 2011 (Birjit R.K, *pers. obs.* 2014) and November 2014 (Raju Kasambe, *pers. obs.*).

OTHER KEY FAUNA

During a short survey in November, 2014 conducted by IBCN at three sites, Dailong, Namtiram, and Tharon villages, two small mammals, namely Himalayan Porcupine *Hystrix brachyura* and Yellow-throated Marten *Martes flavigula* were seen being hunted by tribals. Western Hoolock Gibbon *Hoolock hoolock* and Slow Loris *Nycticebus bengalensis* are found but in small numbers. Among the carnivores, Tiger *Panthera tigris*, Leopard *P. pardus*, Clouded Leopard *Neofelis nebulosa*, Golden Cat *Catopuma temminckii*, Dhole or Wild Dog *Cuon alpinus*, and Asiatic Black Bear *Ursus thibetanus* are found. Many species of butterflies were seen during this survey, including White Dragontail *Lamproptera curius* (Fabricius), Great Mormon *Papilio memnon*, Spotted Sawtooth *Prioneris thestylis* (Doubleday), Red-base Jezebel *Delias pasithoe* (Linnaeus), Red-spot Jezebel *D. descombesi* (Boisduval), Courtesan *Euripus nyctelius* (Doubleday), Popinjay *Stibochiona nicea* (Gray), and Common Jester *Symbrenthia hippoclus* (Cramer).

VULNERABLE	
Rufous-necked Hornbill	*Aceros nipalensis*
NEAR THREATENED	
Grey-headed Parakeet	*Psittacula finschii*
Blossom Parakeet	*Psittacula roseata*
River Tern	*Sterna aurantia*
ENDEMIC BIRD AREA 130: EASTERN HIMALAYA	
Grey Sibia	*Heterophasia gracilis*

LAND USE

- Cultivation
- Forest conservation
- Dailong Micro Hydel Project, 50 x 2 KVA capacity at Joulangpang stream in Lonku Forest

THREATS AND CONSERVATION ISSUES

- Hunting of wild animals
- Collection of forest produce
- Clearing of forest land for *jhum* cultivation

Hunting is a major threat to the wildlife of this area.

R.K. BIRJIT SINGH

There is a demand by the local people to declare Dailong Rongku Forest as a Community Reserve

DHRITIMAN MUKHERJEE

More than 100,000 Amur Falcons are seen during migration between October and November. Thanks to the Environmental Education by DEEPS, a local NGO, hunting of this bird has been considerably reduced

Though Amur Falcon is not hunted in Dailong village, it is hunted at other places in small numbers. Every youngster was seen carrying a catapult and most of the adults were armed with air guns. During a short survey in November, 2014 conducted at three sites, birds were being hunted at Namtiram and Tharon villages. Hunting of small mammals was observed at Tharon and Dailong (Raju Kasambe, *pers. obs.* 2014). A Yellow-throated Marten *Martes flavigula* was hunted by tribals for food (Raju Kasambe, *pers. obs.* 2014). A Rufous-necked Hornbill trophy was seen in a tribal house (R.K. Birjit Singh, *pers. comm.*).

Dailong Ecology & Environment Preservation Society (DEEPS) has requested the Department of Forests and the government authorities to declare the Dailong Rongku Forest as a Community Forest. The NGO carries out plantation of useful trees and saplings in the forest. Conservation of wildlife is yet to be taken up seriously in this area. Dailong village, one of the oldest and largest Naga villages in Tamenglong district, in a meeting held in 1978decided to stop *jhum* cultivation and tree felling in the forest.

KEY CONTRIBUTORS

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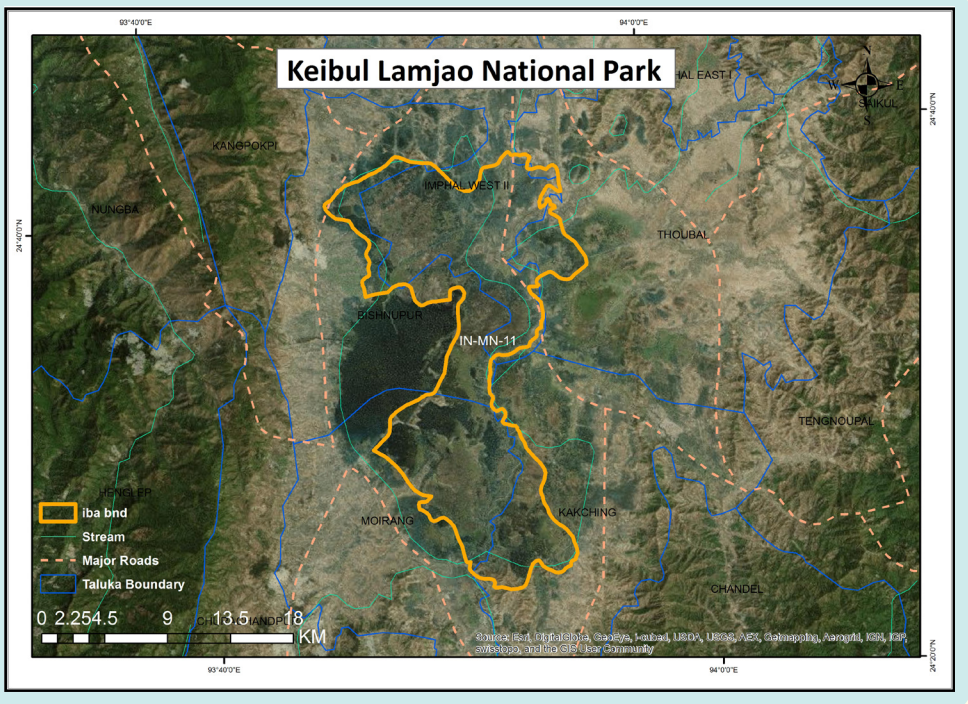
KEIBUL LAMJAO NATIONAL PARK

IBA Site Code	:	IN-MN-11	**Altitude**	:	767–813 msl
State	:	Manipur	**Rainfall**	:	1,400 mm
District	:	Bishnupur	**Temperature**	:	0 °C to 36 °C
Coordinates	:	24° 34° 60' N, 93° 49' 60" E	**Biogeographic Zone**	:	Northeast
Ownership	:	State	**Habitats**	:	Freshwater Swamp, Tall Grassland
Area	:	4,000 ha			

IBA CRITERIA: A1 (Threatened species), A4iii (≥20, 000 waterbirds)

PROTECTION STATUS: National Park, established March, 1977.



GENERAL DESCRIPTION

Keibul-Lamjao National Park, which forms the southern portion of Loktak Lake, is a large continuous mass of swamp with floating mats of vegetation, locally known as *phumdi*s, covering much of its surface. *Phumdi*s are composed of decaying vegetation, up to 1.6 m thick and 80% submerged, and can support the weight of large mammals. The vegetation comprises *Zizania latifolia*, *Leersia hexandra*, *Phragmites karka*, *Cepithipedium* spp., *Carex* spp., *Saccharum munja*, *Coix lacryma-jobi*, *Narenga porphyrocoma*, and *Polygonum perfoliatum*. Within Indian limits, *Zizania latifolia* is found only in the Loktak Lake system (Choudhury 2002). There are small hillocks within Keibul-Lamjao, namely Chingjao, Pabotching, and Toyaching, which provide refuge for large mammals during wet periods (Yadava & Varshney 1981, Scott 1989).

Keibul-Lamjao NP (4,000 ha) is home to the Endangered Manipur Brow-antlered Deer *Cervus eldi eldi*, one of the three subspecies of Thamin Deer *Cervus eldi*. It is popularly known in Manipur as Sangai and is also the State Animal. Keibul-Lamjao NP was created to protect this deer. It was reported to be extinct in 1951, but a survey conducted by IUCN revealed that a few animals exist in the park. Sangai are specially adapted to this floating habitat, with their characteristic hooves, which unlike other deer species help the animal to walk easily over the floating islands.

AVIFAUNA

Keibul Lamjao is part of the Loktak Lake ecosystem which is a refuge to thousands of birds of at least 116 species, including 21 species of waterfowl. Their numbers would easily exceed 20,000 (A4iii criteria: site is known or thought to hold, on a regular basis, equal to or more than 20,000 waterbirds or >10,000 pairs of seabirds of one or more species). It also

has records of the Vulnerable Greater Spotted-eagle *Clanga clanga* and the Near Threatened Spot-billed Pelican *Pelecanus philippensis*. The Lesser Adjutant *Leptoptilos javanicus* has also been reported. So the site also qualifies for A1 criteria. There are records of the Vulnerable Pallas's Fish-eagle *Haliaeetus luecoryphus* and Near Threatened Ferruginous Duck *Aythya nyroca* (Choudhury 2009).

There are many old reports of Eastern Sarus Crane *Grus antigone sharpii*. Higgins (1934) mentions that the species is "not uncommon, residing and breeding in the swamps in the south of the valley: but it is not shot". The birds were mainly found in pairs, and once a large flock of 20 to 30 individuals was seen. The Hooded Crane *Grus monachus* was also found in Manipur, nearly 100 years ago, but none have been seen in recent decades.

OTHER KEY FAUNA

Altogether 425 species of animals (249 vertebrates and 176 invertebrates) have been identified in the lake system, which is a breeding ground for several fish species. The total faunal diversity is likely to be higher, as many species have not been identified or surveyed.

In a joint census conducted in May 2013 by the Manipur Forest Department, local environmentalists, and wildlife experts, a total of 2,006 Sangai was counted, an increase from 180 in 2003. There is control on poaching of Sangai but stray cases still occur. For instance, in February 2013, forest guards caught two poachers while they were dressing a Sangai carcass at Keibul Lamjao.

Besides the famous Brow-antlered Deer, Hog Deer *Axis porcinus* is also found in Keibul Lamjao but in low numbers due to earlier hunting pressure. Choudhury (1992) estimates a population of about 200 individuals. Other fauna includes the Large Indian Civet *Viverra zibetha*, Small Indian Civet *Viverricula indica*, Common Otter *Lutra lutra*, and may be other otter species too. A good population of Wild Boar *Sus scrofa* is present, as it has no natural predator and is also safe from hunting (Choudhury 1992). Sighting of Sangai and Hog Deer from the tower located near the rest houses has become frequent, indicating improved conservation measures in the IBA (Anwaruddin Choudhury, *pers. comm.* 2014).

VULNERABLE	
Lesser Adjutant (?)	*Leptoptilos javanicus*
Pallas's Fish Eagle	*Haliaeetus leucoryphus*
Greater Spotted-eagle	*Clanga clanga*
NEAR THREATENED	
Spot-billed Pelican	*Pelecanus philippensis*
Ferruginous Duck	*Aythya nyroca*

LAND USE

- Tourism and recreation
- Wildlife management
- Human habitation

THREATS AND CONSERVATION ISSUES

- Fishing
- Siltation and reclamation
- Pollution

DHRITIMAN MUKHERJEE

Keibul Lamjao National Park on the southern side of Loktak Lake (IBA) is famous for floating mats of vegetation locally called *phumdis*

R.K. BIRJIT SINGH

More than twenty thousand waterbirds are found in the protected Keibul Lamjao National Park.
It is famous for Ferruginous Duck, a Near Threatened species

DHRITIMAN MUKHERJEE

DHRITIMAN MUKHERJEE

Manipur Brow-antlered Deer, locally called Sangai, is one of the Critically Endangered mammals of India with perhaps less than 200 individuals in the wild

DHRITIMAN MUKHERJEE

Ferruginous Duck is found in fairly large numbers in Keibul Lamjao, Loktak Lake and other wetlands of Manipur

The Loktak Lake ecosystem has changed considerably after the construction of a multipurpose hydroelectric and irrigation project, greatly impacting the water regime and consequently Keibul Lamjao. The natural wetland with fluctuating water level was converted into a reservoir with a more or less constant water level. Besides bringing about basic hydrological changes, this resulted in severe problems for the lake biota and the communities traditionally dependent on it. Loktak has, therefore, been placed in the Montreaux record, a list of internationally important wetlands (Ramsar Sites) that have undergone or are undergoing significant changes in their ecological character. Currently, Loktak system is threatened by excessive loading of silt and nutrients from various anthropogenic sources. Deforestation, shifting cultivation, uncontrolled use of fertilisers in agricultural lands, and discharge of domestic wastes, all contribute to the input of silt and nutrients into the lake. This will accelerate the ageing of the lake by rapid siltation and excessive biomass production.

Recently the Loktak Development Authority has started removal of *phumdis* from Loktak Lake and some are being dumped on the northern part of Keibul Lamjao. While it is opening up more areas of the lake but filling in of part of Keibul Lamjao may have its own ecological issues that needs to be looked into. It may be good for the park to some extent but on a larger scale its impact needs critical assessment (Anwaruddin Choudhury, *pers. comm*. 2014).

Populations of both migratory and resident waterfowl, several macrophytes, and fish have rapidly declined in the past few decades. Shooting, netting, pesticide pollution, and hydrological changes, as well as increased human presence, fishing, removal of vegetation, and tourism have all contributed to the decline in bird numbers. There is an increasing tendency among people to kill the birds for consumption and sale. Earlier, birds were trapped but in recent years, villagers have taken to poisoning them with insecticides and pesticides placed in small fish bait.

Another recent danger is the chemically-induced clearance of *phumdi*s by fishermen to develop and maintain clear open water for fishing. The State Forest Department has started a massive environmental education campaign to stop this practice as the *phumdi*s are an integral part of the park ecosystem.

KEY CONTRIBUTORS

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